Senate Hearings

Before the Committee on Appropriations

Departments of Labor and Health, Education, and Welfare and Related Agencies Appropriations

H.R. 10061

92d CONGRESS, FIRST SESSION

Fiscal Year 1972

Part 6 (Pages 3617 to 4355)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTES OF HEALTH

DEPARTMENTS OF LABOR AND HEALTH, EDUCATION, AND WELFARE AND RELATED AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1972

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS UNITED STATES SENATE

NINETY-SECOND CONGRESS

FIRST SESSION

ON

H.R. 10061

AN ACT MAKING APPROPRIATIONS FOR THE DEPARTMENTS OF LABOR AND HEALTH, EDUCATION, AND WELFARE AND RELATED AGENCIES, FOR THE FISCAL YEAR ENDING JUNE 30, 1972, AND FOR OTHER PURPOSES

Printed for the use of the Committee on Appropriations

U.S. GOVERNMENT PRINTING OFFICE
63-792 O
WASHINGTON : 1971

KA11
.A6
1972
S
pt.6

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS

WARREN G. MAGNUSON, Washington, *Chairman*

JOHN STENNIS, Mississippi	NORRIS COTTON, New Hampshire
ALAN BIBLE, Nevada	CLIFFORD P. CASE, New Jersey
ROBERT C. BYRD, West Virginia	HIRAM L. FONG, Hawaii
WILLIAM PROXMIRE, Wisconsin	J. CALEB BOGGS, Delaware
JOSEPH M. MONTOYA, New Mexico	CHARLES H. PERCY, Illinois
ERNEST F. HOLLINGS, South Carolina	EDWARD W. BROOKE, Massachusetts
ALLEN J. ELLENDER, Louisiana	MILTON R. YOUNG, North Dakota

Professional Staff
Harley M. Dirks
W. Proctor Jones
Wm. J. Kennedy

DEPARTMENTS OF LABOR AND HEALTH, EDUCATION, AND WELFARE AND RELATED AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1972

TUESDAY, JULY 20, 1971

U.S. Senate,
Subcommittee of the Committee on Appropriations,
Washington, D.C.

The subcommittee met at 10 a.m. in room 1223, New Senate Office Building, Hon. Warren G. Magnuson (chairman) presiding.

Present: Senators Magnuson, Cotton, and Boggs.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

National Institutes of Health

STATEMENT OF DR. ROBERT Q. MARSTON, DIRECTOR

ACCOMPANIED BY:

DR. JOHN F. SHERMAN, DEPUTY DIRECTOR, NATIONAL INSTITUTES OF HEALTH;

DR. LEONARD D. FENNINGER, ASSOCIATE DIRECTOR FOR HEALTH MANPOWER, NATIONAL INSTITUTES OF HEALTH;

DR. DEWITT STETTEN, DIRECTOR, NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES;

DR. KENNETH M. ENDICOTT, DIRECTOR, BUREAU OF HEALTH MANPOWER EDUCATION;

DR. MARTIN M. CUMMINGS, DIRECTOR, NATIONAL LIBRARY OF MEDICINE;

DR. CARL BAKER, DIRECTOR, NATIONAL CANCER INSTITUTE;

DR. EDWARD MacNICHOL, DIRECTOR, NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND STROKE;

DR. THOMAS J. KENNEDY, JR., ASSOCIATE DIRECTOR FOR PROGRAM PLANNING AND EVALUATION, NATIONAL INSTITUTES OF HEALTH;

LELAND B. MAY, ASSISTANT DIRECTOR OF FINANCIAL MANAGEMENT (BUDGET), NATIONAL INSTITUTES OF HEALTH; AND

CHARLES MILLER, DEPUTY ASSISTANT SECRETARY, BUDGET

1971 APPROPRIATION AND 1972 BUDGET REQUEST

Senator Magnuson. We will take up the budget request of NIH which includes the research institutes, health manpower, and other programs administered by NIH.

For the record, the 1971 comparable appropriation for NIH was $1,683 million, and the 1972 request is $1,900 million, an increase of $217,207,000.

A further breakdown for the research institutes, $1,291,841,000 is requested for 1972 as compared to the 1971 appropriation of $1,000,166,000, an increase of $125,583,000, which includes the $100 million for the new cancer initiative, leaving $25,583,000 in 1972 increases for the various institutes.

The health manpower 1971 comparable appropriation was $452,410,000. 1972 is $541,192,500, an increase of $89 million plus. But of the request, only $168 million is authorized, leaving $373 million unauthorized.

Dr. Robert Marston, Director of NIH, is here and we will put in the record the names of the people accompanying you. Doctor Marston, you may proceed with your statement.

Dr. Marston. Mr. Chairman, on my immediate right is Dr. John Sherman, who is the Deputy Director of the National Institutes of Health.

I will introduce others as questions may be directed to them this morning.

I always welcome the opportunity to testify before this committee about the goals, the plans, and the needs of NIH in carrying out its responsibilities for medical research, education in the health professions, and biomedical communication.

Today I am particularly pleased to do so because you have before you budget estimates for NIH which I feel I can defend not only with a good conscience but with some enthusiasm.

This does not mean, of course, that the budget fulfills all our desires or even that it satisfies every identifiable need.

In an activity so broad in scope and so varied in substance as that of NIH, it is inevitable that choices have to be made, that priorities must be weighed, and that some desirable—and readily justifiable—projects must be deferred. But the NIH budget as a whole—looked at as a measure of the Federal commitment to the support of medical research and education, rather than merely as a catalog or program estimates—is an encouraging document.

To put the 1972 budget estimates into proper perspective, we must, I think, compare them with the 1970 level of the NIH programs. As you know, we operated during the first half of fiscal year 1971 under a continuing resolution which held the programs to their 1970 levels. The increases over that level only became available for obligation in February when the 1971 appropriations were apportioned by the Office of Management and Budget.

1971 APPORTIONMENT

I must say, in all candor, that the apportionment was more generous than we had expected. All of the congressional increases, totaling nearly $147 million, were made available for obligation—except the $15 million increase in funds for health facilities construction grants which remain available until expended and were therefore held over until this year.

What is more important is that the congressional increases became part of the budget base and were taken into account in preparing the 1972 estimates.

For NIH as a whole, the funds available for 1971 provided an increase of more than $209 million over the operating level that was obtained during 1970 and the first 8 months of fiscal 1971. The budget request for fiscal 1972 includes an overall increase of nearly $243 million over 1971.

If the budget request is approved by the Congress, the total increase in the operating level will thus be a little over $452 million over the 1970 budget. This is an increase of a little over 31 percent in which is nominally a 2-year period. Actually, however, if this appropriation bill comes into effect before the end of this calendar year, a 31-percent increase in funds available for NIH programs will have come about in a little less than a year.

The delayed congressional increases in the 1971 appropriations and the requested increases in the 1972 budget will thus have a combined and cumulative effect on the NIH programs that marks, I believe, the beginning of a new and more vigorous phase in Federal support for both medical research and education in the health professions.

I am particularly hopeful that it will reestablish lost momentum in the research area. As you well remember, Mr. Chairman, the rapid expansion of biomedical research, for which the Congress was largely responsible, began in 1957 and covered a period of 7 years of great plenty.

Unfortunately, beginning in 1964, the fortunes of NIH continued to follow that Biblical pattern and we now have had 7 lean years. During this latter period, especially during the past 4 or 5 years, there has been a slow but steady loss of momentum in existing programs and very little opportunity for the initiation of new ones to take advantage of new leads or to meet new needs.

Our main concern has been to hold the line and this has become increasingly difficult as the number of projects NIH was able to support has continued to shrink due to the combined effects of expenditure restrictions and rising costs—particularly for clinical research involving bed patients. I believe that this downward trend can now be halted and I am enough of an optimist to hope that we may, once again, be at the beginning of the Biblical cycle.

The 1972 budget estimates for the research institutes and divisions are based on 1971 appropriations that were $128.9 million higher than the 1970 operating level and they include requested increases that total an additional $125.6 million. This overall increase of $254.5 million for the research programs represent a 24-percent increase over their operating level in 1970 and the first half of 1971.

CANCER CONQUEST PROGRAM

The fact that $153 million—or three-fifths—of the total increase in research funds is for cancer research, including the $100 million already appropriated for the new cancer conquest program, will not detract from its effect on the momentum of biomedical research as a whole though it will, to some extent, change its pattern and directions —as, indeed, is the intent.

Nearly doubling the funds available for cancer research reflects a choice of priorities—the recognition of a major national health concern and a determination to take advantage of what are thought to be new opportunities for making progress in the attack on cancer. Dr. Baker, the Director of the National Cancer Institute, will be happy to speak in detail about these opportunities.

The fear that so much emphasis on a particular group of diseases will distort or detract from research on other serious health problems, while not without foundation, can be exaggerated.

Many factors, besides the availability of financial support, determine the directions of research: the existence or absence of enticing "leads" for further exploration; the scientific background, professional experience, and personal interests of the investigator; the opportunities for research in terms of available facilities and, in the case of clinical research, an adequate supply of patients with the disease in question; and, in many cases, the intellectual challenge of a particular problem.

I doubt that the interplay of these factors has ever produced a "balanced" pattern of research—if, indeed, "balance" could be defined in this context. Nor do I think that balance is important in research. The research programs of each of the institutes must be judged on their own merits. The size of the Federal investment in various fields of research must be based on the magnitude of the health hazard with which they are concerned, on the importance that the American public attaches to the mitigation or elimination of these hazards, and on the scientific opportunities that are at hand for fruitful research.

The latter is particularly important because it is as foolish to force-feed a field in which there are very few leads as to starve a field in which leads are waiting for exploitation.

The balance with which we should be most concerned is that between research opportunities and the availability of resources for their exploitation.

The funds provided for the uncertain business of probing the unknown in relation to disease problems should reflect the state of the art in the various biomedical disciplines and clinical research fields rather than well-intentioned but extraneous decisions based on political, economic, or social factors.

Moreover, cancer research should not be viewed as an isolated—or isolatable—activity. The most important reason for keeping the cancer conquest program within the family of the National Institutes of Health is that cancer research is inescapably intertwined with various aspects of the research missions of the other institutes.

The complex questions to which biomedical research must address itself and the work that goes into their solution are almost never unique to a particular disease or confined to single scientific disciplines.

The present excitement about the role of viruses in causing cancer—which is one of the reasons for feeling that the time is ripe for a cancer conquest program—illustrates the way in which progress in one field of research depends on work being done in another.

Virologists, who for years have been mainly concerned with unravelling the mysteries of infectious diseases, such as the common cold, for which viruses are thought to be responsible, have provided the leads and are now doing much of the work in viral carcinogenesis. Further refinement of this work is now leading deep into the basic sciences of molecular biology and genetics.

GENETICS

For example, a very important development of the past year is the discovery that the cell chemical known as DNA is not the sole and unique determinant of genetic patterns it was heretofore thought to be. It has now been shown that RNA, the chemical messenger that carries instructions inherent in DNA's "code," can, in some cases, dictate how DNA is formed and thus itself control the cell.

A series of rapid developments led to the discovery that an enzyme that uses RNA as a blueprint to make DNA is present in more than 30 different viruses that can cause various forms of cancer in birds, mice, cats, and monkeys. Last November, one of our scientists reported that he had found this enyzyme in the white blood cells of patients with acute leukemia and it has since been found in patients with breast cancer. It is also known that certain classes of drugs inhibit the activity of this enzyme, at least in the laboratory.

However, the next link in this very promising chain of events was the disappointing discovery that the enzyme can also be found in normal cells—which poured cold water on what had been a very hot lead in the search for the mechanism by which a virus can cause some forms of cancer. But further research now seems to show that there is a significant difference between the enzyme found in normal cells and that found in malignant cells—and the trail is once more warm. In so complex a field as medicine in which so much basic information is still lacking, progress frequently involves a few steps forward and a few steps back. For this reason, the aspect of the cancer conquest program that concerns me most is the danger of overpromise—a concern, Mr. Chairman, which I know you share.

The progress that has been made in cancer research in recent years is impressive and highly encouraging. It has, as the President said in his health message, opened "many new lines of inquiry and many new opportunities for breakthrough." But he wisely pointed out that the technological challenge of the space program holds no parallel for the more basic scientific challenge of biomedical research and he added that "scientific breakthroughs * * * often cannot be forced—no matter how much money and energy is expended." That is a point of which the public should be constantly reminded.

In previous appearances before this committee, I have emphasized the indispensability of research in the basic biomedical sciences to future progress in applied clinical research on human disease problems. As Sir Francis Bacon said more than 350 years ago, "Knowledge and human power are synonymous, since the ignorance of the cause frustrates the effect."

In the field of medicine, the painstaking and often frustrating burden of assembling the necessary knowledge still rests largely with those engaged in so-called basic research. As the public and national purpose of the research Institutes of NIH is to promote the health of the American people through research, they must maintain a judicious balance between empirical, frontal attacks on disease problems—which do sometimes yield practical, though often imperfect, results—and the more analytical and circuitous search for an understanding of the nature of disease.

Clearly, the NIH programs must be responsive to national aspirations but the response must not be allowed to deflect them from the dogged pursuit of the scientific knowledge which alone can lead to real solutions of disease problems. As Prof. Joel H. Hildebrand, the eminent chemist at the University of California, has said: "Science is not a sacred cow that sometimes works miracles, but a workhorse that carries loads."

Among the basic science activities of special importance at this stage in the evolution of medical knowledge is genetics research for which the Congress provided an additional $10 million to launch a special program of project grants.

GENETICS COORDINATING COMMITTEE

In accordance with the congressional directive, I appointed an Inter-Institute Coordinating Committee on Genetics which recommended that awards be made for 162 applications that had been approved and given high priority by the advisory councils of seven of the Institutes. These awards totaled $7,750,000, bringing the amount invested in the genetics program during 1971 to about $60 million.

The increase has made it possible to fund all high-priority applications in genetics of which we previously had a considerable backlog. Dr. Stetten, who rejoined NIH last fall as the new director of the National Institute of General Medical Sciences which has the major responsibility for the genetics program, will be glad to answer any questions you may have about the future course of these activities.

In addition to the basic biomedical sciences, there are many areas in more immediately disease-related research in which a number of the Institutes share a common interest. One such area is sickle cell anemia, an hereditary blood disease that is one of the most common long-term illnesses among black children and young adults. No permanently effective treatment has yet been discovered and most of the victims of sickle cell anemia die before their 30th year.

One of the scientists on the intramural research staff of the Arthritis Institute has done pioneer work on the molecular nature of this disease and four Institutes are at present supporting research on sickle cell anemia through their grant programs: The Arthritis Institute which supports work focused on the metabolic nature of the disease; the Heart and Lung Institute which is concerned with blood abnormalities; the National Institute of General Medical Sciences which supports research on the basic biochemistry involved; and the Child Health Institute which is concerned with the diagnosis and treatment of childhood diseases.

Their total investment in 1971 was $1.5 million. Because of the importance of this disease to the black community and because there has recently been a promising advance in the management of acute crises of sickle cell anemia, the budget request for the Heart Institute includes an additional $5 million to expand work in this area by all of the interested institutes.

I appointed a small task force, representing the three institutes most directly concerned, which drew up plans for the expanded sickle cell anemia program that the President announced in his health message. Dr. Cooper, Director of the Heart and Lung Institute, will be glad to describe this program in more detail.

Another area that spreads well beyond the interests of a single Institute, is in research on the type of hepatitis that sometimes results from blood transfusions or the use of blood products. Here, I am happy to say, we seem to be on the verge of major advances.

You may have seen newspaper stories about preliminary reports from Dr. Saul Krugman of New York University, which indicate that it may now be possible to develop a vaccine for this type of viral hepatitis, which causes about 50,000 illnesses a year. There have also been some promising developments in devising tests to determine whether blood is free of this hazard.

HEPATITIS

Six components of NIH are involved in research on hepatitis:

The Division of Biologics Standards is responsible for establishing and maintaining standards of quality and safety for all biologic products, which, of course, includes human blood for transfusion, products prepared from blood, and the test materials and methods used to assure that they meet the required standards.

The national blood resource program of the National Heart and Lung Institute is responsible for improving blood resources and their usage, including the development of new technology to insure the safety of these uses.

The National Institute of Allergy and Infectious Diseases is responsible for research on the causative agents of viral hepatitis, for development of new methods for detecting hepatitis virus, for vaccine development, and for the production and distribution of reference reagents.

The National Institute of Arthritis and Metabolic Diseases has a general responsibility for research in liver diseases including clinical diagnosis, medical management, and the fundamental processes underlying these diseases.

The Clinical Center, which is a major user of blood and blood products, is an intrinsic part of our research effort on hepatitis.

Finally, the broad virologic and immunologic capabilities of the National Cancer Institute are being called on to help solve some of the basic problems involved as well as to assure that new vaccines are free of tumor-inducing viruses.

In addition to the scientific problems, the elimination of the hepatitis risk in blood transfusions will involve complex logistical and legal problems. I have therefore appointed a task force on hepatitis to coordinate the activities within NIH and to mesh these with the responsibilities of other agencies, both Federal and non-Federal.

I shall leave to the Directors of the Institutes the task of setting forth the purposes of the increases in the estimates for the various NIH research programs. It may, however, be useful to summarize for you major changes in NIH research activities as a whole.

In addition to the program increases I have already mentioned, a net increase of $9.6 million is requested for the National Institute of Child Health and Human Development, for family planning and population research.

An increase of $5.3 million is requested for the general expansion of the activities of the still relatively new National Institute of Environmental Health Sciences of which Dr. David Rall is the new Director, succeeding Dr. Paul Kotin who has left us to become vice president for health sciences of Temple University.

REGULAR RESEARCH GRANT PROGRAM

For our regular research grant program, there is a net increase of $18.4 million in the budget. However, as an additional $23 million will be required to honor our moral commitments to ongoing projects, there will be a decrease of $4.6 million for new grants or the renewal of grants beyond their present commitment.

There is also a $5 million reduction in the funds requested for the general research support grants, of which $2 million reflects the discontinuation of the health sciences advancement awards which were part of this program.

A decrease of $7 million for fellowships in part reflects the planned phaseout of predoctoral fellowships. In general, the policy is to hold the postdoctoral and special fellowships to slighly below their 1970 level.

Due to the congressional increase in fellowships funds for 1971, the actual number of these followships awarded with 1971 funds was a little higher than in 1970: 1,499 instead of 1,385. The budget estimate for 1972 allows for only 1,020 of these fellowships, so that the average for the 2 years will be only slighly below the 1970 level.

In other words, Mr. Chairman, the number of people holding postdoctoral and special fellowships will be roughly the same in 1970, 1971, and 1972.

In accordance with the agreement with the Office of Management and Budget to defer any modifications of the training grant programs until the training study now underway has been completed, there is no change in the amount requested for training grants.

An apparent reduction of $23 million for the training programs, in some budget tables, is due to the transfer of that amount—which represents the faculty-salary component of the training grants—from the Institute appropriations to the health manpower appropriation.

The amounts for faculty salaries in all research training grants awarded to an institution will be paid by the Bureau of Health Manpower Education, in a lump sum, to the dean, so that he will have some flexibility in the use of these funds.

Since last year's hearings, much thought has been devoted to the development of national policies for health manpower. The administration's study of health options for the Nation came to the conclusion that more health manpower, more evenly distributed geographically, is an essential prerequisite if we are to have a national policy of providing equal access to high-quality health care for all Americans.

The Carnegie Commission's report on "Higher Education and the Nation's Health—Policies for Medical and Dental Education" has made a number of thoughtful recommendations and has provoked much discussion of the effect of health personnel shortages on our health-care problems. Partly as a result of these two studies, the administration has proposed legislation to stimulate the production and better distribution of more health professionals.

HEALTH MANPOWER PROGRAMS

The health manpower programs of NIH are based on four pieces of authorizing legislation. Two of these, the Allied Health Professions Personnel Training Act and the provisions in the Public Health Serice Act relating to public health training, were renewed last year for a further 3 years. The other two, the Nurse Training Act and the Health Professions Educational Assistance Act, expired on June 30; and their revision and renewal is, as you know, now under consideration by the Congress.

The administration's proposals for the revision of these two pieces of legislation involve a number of important changes in policy and in approach—notably in regard to institutional support and student assistance. The budget estimates for the health manpower appropriation reflect these proposed changes.

However, the legislative committees in the House and Senate are considering alternative bills that, if adopted, would require quite different financing. It is, therefore, difficult to discuss the budget estimates for health manpower until the nature of the authorizing legislation is clear. I shall, therefore, not comment further on the health manpower programs at this time.

However, both Dr. Endicott, the Director of the reorganized Bureau of Health Manpower Education, and I shall be happy to answer any questions that you may have about the manpower programs or the proposals for their continuation and revision.

NATIONAL LIBRARY OF MEDICINE

There are only modest increases in the budget request for the National Library of Medicine: $471,000 over the 1971 budget authority, and $2.2 million over 1970 operating level. Of the increase provided in the 1971 appropriation, $500,000 was earmarked for the development of plans for the Lister Hill National Center for Biomedical Communication which the Congress authorized 2 years ago in honor of Senator Lister Hill who, during his long service in the Senate, did so much to promote Federal health activities and, particularly, medical research.

The National Library of Medicine, whose role is very much broader than that usually brought to mind by the word "library," is an essential adjunct to the research activities of NIH. It plays a major part in the very important—and very difficult—task of making research results readily available to health practitioners and to other researchers.

In carrying out this task, the National Library of Medicine—under the dynamic leadership of its Director, Dr. Cummings—has gone far beyond the traditional archival functions of a library to become, in fact, a national communications center for biomedical information.

As I said at the beginning of this statement, the budget estimates for the fiscal year 1972 do not answer all our prayers and they will not meet every need that someone in the biomedical community—or, indeed, on the administrative staff at NIH—regards as urgent and important. But this is inevitable and, in some degree, always has been and always will be true.

I am satisfied, Mr. Chairman, that this is not only a good budget but that it provides for a real resumption of initiative in the research area and that the amounts requested—and the purposes for which they are requested—will greatly stimulate progress both in health research and in the provision of adequate health manpower, when that situation is further clarified by actions now before the Congress.

If the increases in the NIH budget since I appeared before this committee last year are, indeed, the harbingers of future support, we can look forward to another regarding period of growth in the advancement of the health of the American people.

Thank you, sir.

Senator MAGNUSON. Thank you, Doctor, for that very comprehensive and fine statement.

I want to go back to page 2 of your statement in which again you reiterate the policy, you say that all of the congressional increases totaling nearly $147 million were made available for obligation.

What do you mean by that?

OBLIGATION OF 1971 FUNDS

Dr. MARSTON. Mr. Chairman, we will obligate during fiscal 1971 all of these funds with the exception of the $15 million.

Senator MAGNUSON. In other words, the extra amount that we put in for fiscal 1971 prior to previous years has all been obligated this time except the construction?

Dr. MARSTON. Except the construction funds and I think also I should add in candor that some of the funds were used to absorb the pay raise. But all of the congressional appropriations with the exception of the $15 million for construction.

Senator MAGNUSON. So that, contrary to prior policy, very little has been held in reserve.

Dr. MARSTON. And all of that has been carried over and it is still available. That $15 million is still available for construction this year.

Senator MAGNUSON. I don't know. It is going to be a long, hot summer before that freeze is taken off. But we understand the problem in the construction.

Now, you also say on page 2 the budget request for fiscal 1972 includes an overall increase of $243 million.

Does that include the health manpower section or just the Institutes?

Dr. MARSTON. That includes the health manpower section.

Senator MAGNUSON. What does the $243 include?

Dr. MARSTON. That includes $125 million for the Institutes and for the manpower the total increase is——

Senator MAGNUSON. It would be different, would it not?

Dr. MARSTON. Yes. It is about $116 million; yes.

Senator MAGNUSON. Now you go on to say that this is an increase of over 31 percent in what is nominally a 2-year period.

What do you mean by the 2-year period?

Dr. MARSTON. Mr. Chairman, I have handled this a little bit differently this year largely because the 1972 budget process really did overlap the 1971 one. Quite frankly, we did get more money to spend out of the 1971 appropriation than we had expected.

Senator MAGNUSON. That is because of the continuing resolution problem?

INCREASES DURING 1970–72 PERIOD

Dr. MARSTON. No, sir. The main reason was that in previous years the apportioning process allowed us less money than the appropriation. But this year we were able to spend all of the congressional increases for 1971.

I thought it was well to point out, in talking about the 1972 budget, that it compares to the 1970 spending level which persisted until February of 1971.

Senator MAGNUSON. What I am trying to get at is that if this bill, which we think it will be, we hope to get it done by August 6, that may be a faint hope but I think we can do it, would that make any difference in the percentage of increase to the Institute?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Otherwise, you would have to go on with the continuing resolution based on the 1971. Would that make any difference?

Mr. MILLER. I think, Mr. Chairman, what Dr. Marston is saying is that if you look at the appropriation in 1971 and the budget for 1972 you don't see much of an increase. But if you look at it the way he is describing it—considering when the apportionment for 1971 became available and when we expect to have the 1972 funds available, which is a period of less than a year—a substantial increase will become available quickly.

Senator MAGNUSON. Then you answered my question; time is of importance here when you discuss an increase.

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Rather than what happened last year or the year before.

Dr. MARSTON. Right.

PRIOR 7 YEARS FUNDING

Senator MAGNUSON. Now, on page 3 you do mention the last 7 years as against the prior 7 years. Of course, I am going to have to look very carefully at this 31 percent. I think you are just holding your own out there. But we will see. Maybe it will make a difference.

A lot of testimony that we have been getting from outside interested, dedicated people, they always seem to harken back in some of these places to the 1969 budget for some reason, that that was the prime year as far as they were concerned. We will make that comparison.

But I think we might be up a bit with this budget from 1969, won't we?

Dr. Marston. Yes, sir. We will be above 1969 in terms of actual dollars. In 1969, we had an appropriation of $1,100,000,000 and the request for 1972 is, as you know, $1,191,000,000.

Senator Magnuson. That is for the Institutes?

Dr. Marston. Yes, sir. We will be above the 1969 level.

Senator Magnuson. I think one bit of testimony that we had, and I will ask you about it, is that in order to keep abreast of just where we were, a little like Alice in Wonderland, you know she had to keep running to stay where she was, I don't know where they get the figure but it comes out about 8 percent increase every year—8.6, as I recall.

This budget would be above that for 1972 with the amount of money you have available, would it not?

Dr. Marston. Yes, sir. It would be above, but one has to count the total increase in research in 1972 over 1971 as $125 million, of which $100 million is an increase in the cancer area. So, in that special case, it would be more than the increase for inflation. In other cases, it would not.

Senator Magnuson. The overall increase of the $254.5 million in the research programs represents, you say, a 24 percent increase over their operating level in 1970, and the first half of 1971?

Dr. Marston. Yes, sir.

Senator Magnuson. When you speak of the operating level, you mean the money available for expenditure?

Dr. Marston. Yes, sir.

Senator Magnuson. That sometimes is different from the appropriation.

Dr. Marston. Yes, sir.

Senator Magnuson. So, you will have, you think, about 24 percent more money to spend under the 1972 figures?

Dr. Marston. Yes, sir.

Senator Magnuson. With the $254 million?

INCREASE IN CANCER FIELD

Dr. Marston. Yes, sir. And about three-fifths of that will be in the cancer field.

Senator Magnuson. Now, on page 4 you mentioned that, three-fifths, but you use the figure of $153 million.

Where did you get that?

Dr. Marston. That was the $53 million increase in 1971 over the 1970 level and then the $100 million that you already acted on.

Senator Magnuson. It is a special fund?

Dr. Marston. Yes.

Mr. Miller. Dr. Marston is talking over a 2-year period, not a 1-year period.

Senator Magnuson. But that will amount to $153 million as of now?

Dr. Marston. Over the 1970 base; yes, sir.

Senator Magnuson. Over the 1970?

Dr. Marston. The 1970.

Senator Magnuson. Then you will have to determine what the Congress does on the Cancer Institute over and above that if they do anything?

Dr. Marston. Yes, sir.

Senator Magnuson. We will discuss with you and Dr. Baker a number of the different things there, but I think your statement is very good about the problem we had in this cancer matter.

I suppose there is no one in the Senate that was more agonized about it than I was. Having created the original, helped create the original Cancer Institute, and watching NIH grow around it, and then having the problem of a possible separation—well, cancer cuts across all biomedicine—I had my fingers somewhat crossed as to what to do.

Several people came to me and asked me about it, knowing of my long association with it. I just couldn't give them much advice, but I did not favor separation of these efforts. I think we can live better with it the way it is, do you not?

Dr. Marston. Yes, sir.

Senator Magnuson. I hope we won't get so involved with the sorting out of responsibilities that we all get lost in some kind of a maze some place.

Dr. Marston. This is a point that I have tried to make repeatedly, Senator Magnuson. There is a major job to be done in getting on with cancer research. I hope that we do not spend all of our time in debates about the administrative aspects.

Senator Magnuson. Yes. The administrative issue is a question of when and what to delegate or not to delegate.

Dr. Marston. Yes. I think the delegation question is a very key one.

Senator Magnuson. We appreciate your testimony on the role of viruses which we read so much about.

I will stop at this point and ask Senator Boggs if he has any questions on this particular phase of it.

I wanted to get all those figures straight first.

Senator Boggs. Yes. Very good.

I do have a couple of general questions, Dr. Marston, and Mr. Chairman.

JOINT NIGMS-NBS STUDY

As you may know, I have become interested in the cooperative study between the National Institute of General Medicine and the Bureau of Standards. I think this is very good, indeed, and I think a lot depends on it if we are to accomplish the goals we have set for the next decade—to deliver medical services across the board to the general public.

I know you support that program which has been carried on.

I notice that the budget carried $4,548,000 for collaborative research and development for fiscal year 1971. As I understand it, however, there is only $3,607,000 budgeted for the fiscal year 1972.

My particular point is that if the 1972 appropriation, for example, would approach the 1971 appropriation in this area of collaborative research and development are you in a position to spend it wisely?

Dr. Marston. Let me be sure I understand.

The figures that I have before me indicate that we intend, in fiscal year 1972, to fund at about the same level the specific activities at the National Bureau of Standards which in 1971 was $338,000 and we anticipate in fiscal year 1972, $332,000.

Now, would you like us to divide this into a discussion of that particular project and then the discussion of other collaborative activities in general medical sciences?

Senator Boggs. That would be helpful, but I wanted to pinpoint this particular one, of course.

Dr. Marston. Dr. Stetten, who is the Director of the General Medical Sciences Institute, is at the table. Perhaps it would be quickest for him to respond.

Senator Boggs. That is correct, about $340,000 for the study for 1971, as I understand it.

GENERAL COLLABORATIVE RESEARCH AND DEVELOPMENT

Dr. Stetten. $338,000, as you quoted it, I think is correct, sir, for 1971.

Senator Boggs. How much would you have in this figure for 1972?

Dr. Marston. Essentially the same.

Senator Boggs. But the overall amount requested in the budget for the general collaborative research and development is less.

Dr. Stetten. Our total request of collaborative research and development is about $3.6 million, which includes the funds for the study with NBS.

Senator Boggs. I was wondering if, for example, the Congress saw fit to add a few more thousand dollars to this project, can you tell this committee whether you would carry on the research wisely and effectively?

Dr. Stetten. We have in hand some correspondence from the Bureau of Standards indicating how they might like to increase this project and undoubtedly what they are proposing is carefully thought through and I am sure that the program could be expedited. At the present time, they have now, I think, about 10 or 12 products which are available to analytical laboratories all over the country. They started with the more commonly performed analytic procedures, glucose, potassium, urea, sterile hormones, cholesterol, biopigments, which they have distributed and they are developing methodology for an ever-increasing number.

They are anxious to get into the treacherous and difficult field of preparing authentic samples of purified protein for distribution.

Senator Boggs. This is a program you support and recognize the validity of insofar as you reasonably can with the money you have available; is that correct?

Dr. Stetten. Yes, sir.

Senator Magnuson. Off the record.

(Discussion off the record.)

Senator Magnuson. On the record.

Will you supply the record, if you can, apropos of our questions about the comparisons of the appropriations and actual expenditures for the past 5 years of each Institute?

Dr. Marston. All right, sir.

Mr. Miller. I would assume you would want obligations rather than expenditures?

Senator Magnuson. Yes.

Dr. Marston. All right, sir.

(The information follows:)

NATIONAL INSTITUTES OF HEALTH

SUMMARY OF APPROPRIATIONS AND OBLIGATIONS

[In thousands]

	1968		1969		1970		1971		1972	
	Appropriation	Obligation	Appropriation	Obligation	Appropriation	Obligation	Appropriation	Obligation [1] estimate	Appropriation estimate	Obligation estimate
DBS	$8,649	$7,699	$8,499	$8,030	$8,239	$3,235	$8,838	$9,277	$8,956	$8,956
NCI	183,356	177,349	185,150	182,436	190,486	181,345	230,383	233,132	[2] 334,338	334,338
NHLI	167,954	162,134	166,927	161,917	171,377	160,258	193,479	194,901	195,492	195,492
NIDR	30,307	29,283	29,983	29,571	30,809	28,716	35,257	35,430	38,829	38,829
NIAMD	143,954	139,321	143,888	140,297	146,619	131,453	138,339	137,956	135,433	135,433
NINDS	128,633	121,979	128,935	126,085	107,365	97,164	105,807	103,485	96,521	96,521
NIAID	94,422	90,430	96,840	92,611	103,694	97,055	102,249	102,337	99,342	99,342
NIGMS	160,284	156,124	163,514	160,104	164,654	148,090	166,072	160,194	150,400	150,400
NICHD	68,621	66,824	73,126	71,205	77,192	75,962	94,436	94,747	103,232	103,232
NEI					24,343	22,805	30,986	30,029	32,639	32,639
NIEHS	17,289	16,709	17,820	17,906	18,328	17,254	20,620	20,151	25,271	25,271
FIC	500		600	937	2,954	2,731	3,582	3,666	3,319	3,319
RR	81,141	76,641	84,810	82,920	76,658	66,932	66,201	66,320	68,069	68,069
Subtotal, IRD	1,085,110	1,044,493	1,100,092	1,074,019	1,122,719	1,038,000	1,196,249	1,191,625	1,291,841	1,291,841
OD					7,323	7,988	8,206	8,903	11,442	11,442
B. & F.					1,900	248		6,715	3,565	6,981
NLM			18,160	21,739	19,682	19,758	20,769	21,436	21,981	21,981
BHME [3]			275,800	387,141	373,616	377,983	431,131	442,283	545,925	563,940
Total NIH	1,085,110	1,044,493	1,394,052	1,482,899	1,525,240	1,443,977	1,656,355	1,670,962	1,874,754	1,896,185

---

[1] Reflects transfers between appropriations to support pay raise costs as authorized by title II, Public Law 92-18.

[2] Includes $100,000 supplemental for special cancer initiative, appropriated in 1971 for obligation in 1972.

[3] First appropriation as NIH component was in fiscal year 1969. (The 1968 appropriations $402,913,000; obligations $409,075,000.) Obligations in excess of apparent appropriations represent carryover funds from prior years for construction grants and effects of advance obligational authority in student assistance as appropriated, to separate compenents of BHME.

PERINATAL STUDY

Senator Cotton (presiding). I am sorry that I was late but I had to go to the White House this morning with the leadership.

You were in the process of asking some questions.

Senator Boggs. I just want to make an observation. I have asked my questions.

I do want to commend Dr. Marston on this fine presentation. I think it is very exciting and very good, and I am impressed with it. I am favorably impressed.

Dr. Marston. Thank you very much.

Senator Cotton. I shall read it most carefully. I am sorry that I missed hearing it.

Doctor Marston, we have some testimony on this collaborative perinatal study.

Dr. Marston. Yes, sir.

Senator Cotton. We have had some very interesting testimony on it.

I have here and I would like to file for the record a letter received by Senator Buckley of New York from the Children's Hospital in Buffalo. The letter, I think, does a good job of outlining the situation.

Have you any comment regarding the study, Doctor?

Dr. Marston. Yes, sir.

I think the point that it is important to make is that in the development of the 1972 budget our discussions concerning many aspects of it were done last fall. There was a tight fiscal constraint on the development of the budget. We did find it necessary to review all of our programs, both as a part of good management and because of the fiscal constraint, and to make some difficult choices about which ones to increase and which ones to decrease.

As I pointed out earlier, when the Congress appropriated more funds for 1971 than we applied for before this committee, the decision was made to spend all of it. We therefore, had some additional changes on the distribution of funds. What I want to focus on is that it is always a difficult, whether one has a level budget, a decrease in budget, or slight increase in budget, to choose among programs.

In these circumstances, we made the decision that the perinatal study be decreased, in the amount that you see here, in the belief that this decrease would not cripple this long-term study.

Dr. MacNichol is the director of the Neurological Institute. He is at the table if you would want any additional details on this.

This is not a decision to cut out the program. It was a decision that was based on tough decisions about the allocation of funds.

Senator Cotton. When the outside witness was before us, I asked a question of the witness and he answered it. The next witness came on to say his answer was wrong. When he got through, I was even more confused than I was in the beginning, which is a very extravagant statement.

The prenatal study does not go into the field of what you refer to and what the layman tries to understand as genetics. What is the distinction?

Dr. Marston. Well, sir, it is not a program that is specifically directed at any one area of investigation. It is a broad program to try to gather together information concerning events before birth and immediately after birth that may have an effect on individuals.

The answer is both "Yes" and "No"; it does involve the impact of events around the birth of a child which may have some basis in genetics. It is not a program that has a specific genetic label on it. So, I can understand how you would get both a "Yes" and "No" to that.

Senator COTTON. That is what I got.

Dr. MARSTON. We hope the results of the study will give us information on the impact of viruses and the impact of other events on genetic events.

PROGRAM REDUCTION IN 1972

Senator COTTON. On this matter of cutting perinatal, this was the Office of Management and Budget that did the cutting?

Dr. MARSTON. No, sir. This is one for which we have to share the responsibility in my office. My immediate office made some of the decisions concerning this cut. The basic question, I think, Senator Cotton, is a difference of opinion about how damaging this amount of cut will be to the long-range goals of the program. We estimated that we could make some cuts—and there was, quite frankly, a difference of opinion as to how much we could cut—in this program without making it impossible to reap the advantages of the many years and many dollars that we have put in the program.

I think the basic debate is how much harm will be done by a cut of this level, and there is a difference of opinion.

Senator COTTON. This is an interesting difference of opinion. I won't dwell on this.

One doctor came in and testified that American mothers dieted too much and kept their weight down too much during pregnancy whereas in Europe they do not, and that this dieting was a bad thing. Then the next doctor came in and said that births were more hazardous if the mother was allowed to get too stout and create too heavy a baby.

Now, that is the kind of testimony that is pretty rough on a bunch of laymen sitting on this side of the table.

What is your decision? Should the mother be fat or thin?

Dr. MARSTON. I think she should be just right. [Laughter.]

I think this is a real problem. It is not just for laymen. At the present state of medical knowledge, for many things that we really need to know we don't have firm unequivocal evidence.

One of the purposes of the analysis of the data gathered in this study is to see the impact, in a large number of births, of the weight of the mother.

Do you want to say whether the study has answered this question or not?

CORRELATION BETWEEN MOTHERS WEIGHT AND PREMATURITY AND LOW BIRTH RATE

Dr. MACNICHOL. I would say it has not definitively.

One thing that has been shown is that there is a definite correlation between lack of weight gain by the mother and prematurity and low birth weight. There are also correlations that have been established between low birth weight and prematurity and various abnormalities of development. Now, these are just correlations.

We need to do much more work to be able to say whether they are cause-and-effect relationships, which is what we really want to know.

I think this testimony in regard to whether or not weight gain is important in having a healthy baby versus weight gain being important in making it more difficult for the baby to be born are both true. This is again a question of weighing off one against the other.

If you are interested, I have an updated study that we would be glad to submit for the record which tells the perinatal program and what it was for and what it intends to do and how far we have gotten.

Senator COTTON. Thank you.

I think that ought to be either copied in the record or attached to the record so that the committee can have it.

We will put it in the record.

Dr. MARSTON. Very well, sir.

(The study information is on page 3929.)

Senator COTTON. Doctor, I am at a disadvantage because I don't know all that the chairman covered. I am sure the chairman did cover this point, but it is one that I have felt rather strongly about.

Now, this Senator, personally, is happy that the President saw fit to lay all this emphasis on cancer research when he called for the extra money. I received, however, a lot of requests from my State that I cosponsor the Kennedy bill, which I declined to do. I think we should do everything in the world on this cancer research; I am glad to see the emphasis on it, but the result has been that we have picked cancer research out and separated it in a sense from the Institutes of Health and made it directly responsible to the executive and his designees.

CANCER RESEARCH VERSUS OTHER HEALTH RESEARCH

It seemed to me that the minute we did that there were some other Institutes of Health that are immediately going to come in next year saying, "We are just as important as cancer. There may not be quite as many people die of the afflictions that come under our jurisdiction, but you have taken one out of the group and given it a special status."

(1) Have you any comments on that, and I know you are not going to be critical of the President, and (2) have you observed any symptoms yet of a feeling on the part of the other Institutes that they are being discriminated against and that they, too, ought to receive this special status?

Dr. MARSTON. Yes, Senator Cotton.

Of course, the bill which has passed the Senate has not had hearings before the House, so Congress has not completed its action on this bill. But the President has made very clear his intention to make resources available in the cancer field in a very special fashion.

We are very much involved in preparation either for the implementation of the legislation, if that passes the House in the form that it has passed the Senate, or to carry out the President's plan which he proposed independent of the legislation. The $100 million additional funds are available and we have asked the Cancer Institute to push the program as rapidly as possible.

I have some concern along the lines that you have talked about. The symptoms that I have seen fall into two categories. First, there has been across the country a general encouragement that the President and the Congress have expressed their interest in cancer specifically, and in biomedical research generally. He and the Congress are applauded for that.

However, there is concern in other fields. The heart people, who accurately claim that cardiovascular disease kills more people than cancer, have wondered what the implications are going to be for cardiovascular disease. The thing that we are watching with concern is the possibility that groups will conclude that the only way to get adequate resources for other major disease areas is to get some type of high visibility such as a separate agency or a separate institute or a line item in the budget.

SEEKING OF VISIBILITY

I have seen increased activity in recent months to seek some special visibility in the Federal budget from this standpoint.

Now, the other concern is, perhaps, an even more serious one. There is concern that it will not be recognized that there is major excitement in other areas of biomedical research comparable, in many ways, to the excitement in the cancer field today.

There are hard advances in the fields of every Institute at NIH. It would be a great misfortune if that was misunderstood and if it was thought that cancer is the only area in which there is a great deal of promise and a great deal of activity.

The third point is the one that I mentioned in my opening statement. I am always concerned when it looks as though we are promising more than we can deliver. We do not, at present, have any evidence that allows us to say when, or even if all of the cancers that afflict man may be cured. We do believe very strongly that by trying harder, by having additional resources available, we can increase the probability and the chances of making advances here but we don't have cancer cures just around the corner and I think it would be very unfortunate if we misled either this committee or the American people. In fact, it could be cruel if one misled the people to believe that we are further along than we are at present.

These are the concerns and excitement that we feel at NIH. There is no question that there has been a mixture of good and concerned feeling throughout the scientific community. I think it is fair to say that the NIH has been shaken by the debate over separating cancer research from the rest of research, and by concern that growth might occur in cancer research at the expense of other areas of research.

Returning to the President's proposal, clearly he was trying to achieve both goals, the goal of increased emphasis on cancer research and the goal of keeping cancer a part of the rest of biomedical research. These were the two goals that Secretary Richardson emphasized as being his interest and the President's interest in the cancer conquest program.

Senator COTTON. You can slice it any way, you want to, I don't know just what the bill will be when it has gone through its various legislative stages, but it does take cancer out and puts it in a special category.

Dr. MARSTON. Yes, sir.

Senator COTTON. That is inevitable.

Dr. MARSTON. Yes, sir.

CANCER RESEARCH CENTERS

Senator **Cotton**. The $100 million cancer supplemental includes $34 million for construction and operation of research centers.

Would or would it not be more beneficial to use this money for research in already existing centers?

Dr. **Marston**. I will start answering that question and then let Dr. Baker carry on.

One of the problems in planning the expanded cancer program is that we don't know yet how large it will be 3 years, 5 years, 10 years, 20 years from now. But even at the level of $330 million for this year and with the President's commitment that he will ask for such additional funds as are needed to get the job done, it is clear that we are going to have to create new resources.

Creation of New Resources and Expansion of Existing Centers

We actually are going to have to do both. We are going to have to create new resources and expand the existing centers.

Perhaps, if it is all right, Dr. Baker, you may want to add to that answer.

Dr. **Baker**. Yes.

I think the problem again is to hit some balance between strengthening the existing capabilities and to try to get some new centers established in areas where they are needed and we don't have them.

Planning is well along in the southeastern United States for one or two centers which will greatly strengthen both the research capability and advanced clinical care.

General Locations of Centers

We have begun discussions in the Mountain States. We are likely to have something in the Denver area, perhaps in the Los Angeles area, or in New Mexico.

We have discussions underway with a group in San Diego which may or may not be a combination of a Salk Institute and the University of California at San Diego.

We have had planning grants in both the Birmingham and Seattle areas and developments are very mature for creating cancer centers in those areas.

So, I think we will see both strengthening of existing centers and the creation of additional ones.

Senator **Cotton**. The purpose, and that was the purpose in my own case, the purpose of new cancer centers is for treatment or diagnosis which is perhaps more important than research.

Dr. **Baker**. Of course, with our appropriations we do not have authority for direct patient care. But when one gets into advanced clinical research the dividing line, of course, between the forefront of clinical care and the forefront of clinical research becomes a fine one, indeed.

In our approaches, partial funding from the research standpoint would be done through our activities and ordinarily these are combined then with other activities from local support. These other programs provide straight care activities. Centers are usually established in conjunction of both improvements in care and improvements in clinical research, hand in hand. We think this is the best way to do it.

Senator COTTON. We have always been up against the practical problem.

Take the State which I represent, which is a small State, per capita it is either third or fourth in its mortality from cancer. It has been our belief, a layman's belief, that was because steps were not taken in time.

If a local doctor is suspicious of a patient's condition and says to send the patient to Boston, many times the patient won't go because it entails too much expense, too much disruption in his life and a certain class of people of limited means just simply wait too long before they obtain the best possible treatment and get surgery in time if that is the case.

Now, there is a good deal of that throughout the country, is there not?

Dr. BAKER. Yes, sir. Certainly in the New England area, particularly northern New England, what you say is true. The people are having to go longer distances.

It is true that New Hampshire has one of the higher rates of cancer mortality per unit of population. There are other factors.

COMPUTER USE IN RESEARCH

The development of computers at Dartmouth—the head of the Institution is an expert in computers—the use of computers, then, in medicine, particularly in radiotherapy, produces some real opportunities there at Dartmouth.

There is no doubt about the importance of creating a center in that area because people are having to travel long distances.

Senator COTTON. That is how we got it.

Dr. BAKER. I agree that many people will not go those distances.

Senator COTTON. I am sorry, there is a vote on and we will have to recess for 5 minutes while I run over and vote. I will come back just as quickly as I can.

(A brief recess was taken.)

Senator MAGNUSON. All right. Now that we have had our seventh-inning stretch, on page 8, Doctor, you mentioned that among the basic science activities of special importance at this stage in the evolution of medical knowledge is genetics research for which the Congress provided an additional $10 million to launch a special program of project grants.

What is the total that is provided or is that the total?

Dr. MARSTON. This was the total add-on funds provided last year of which we spent $7,750,000. We estimate that we are now spending close to $60 million for genetics research.

Senator MAGNUSON. So the total would be $60 million?

Dr. MARSTON. Yes, sir, very nearly that amount. That is almost $10 million more——

Senator MAGNUSON. More than you had before.

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Now, I have juset come from the floor where I put in the independent offices appropriation for the NSF another $25 million to pick up the dropouts, you know, where they had to drop the support basic research in DOD, NASA, and Atomic Energy Commission. They are merely scientific but the National Science Foundation has to fund some of them that they think are especially worthy.

Now, they fund some medical research, too, don't they?

Dr. MARSTON. There is an area of overlap. For that reason, we work very closely with the National Science Foundation. They do not undertake to support medical research, as such.

Senator MAGNUSON. But there may be some of their projects, some of the results you would be interested in?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Or vice versa?

Dr. MARSTON. Or vice versa.

There may be individual projects that might fall either to them or us and we have a mechanism for looking at those areas.

Senator MAGNUSON. They do not have too many of those projects?

Dr. MARSTON. No, sir.

The NIH supports the biomedical research and they support the other area.

NIH CLINICAL CENTER

Senator MAGNUSON. Now, on page 11, you talk about the clinical center, for the record what is that?

Dr. MARSTON. That is a very, very large building; it is called building 10, which contains hospital facilities and laboratories.

Senator MAGNUSON. You are talking about the building?

Dr. MARSTON. The building.

Senator MAGNUSON. And they use blood and blood products?

Dr. MARSTON. Yes, sir; just like any other hospital.

PROBLEM OF HEPATITIS

Senator MAGNUSON. Has there been anything to what I have read that you have to be pretty careful about the use of blood, particularly in relation to hepatitis?

Dr. MARSTON. Yes, sir; it is a major problem.

Senator MAGNUSON. Does it require examination in the hospitals? Or pretty tough screening?

Dr. MARSTON. There are two major approaches at present in trying to control hepatitis from transfusions. Previously about the only thing you could do was to ask an individual, who was donating blood, if he had had hepatitis before and if he had, not to use the blood.

But in recent years a test for the so-called Australian antigen has been devised which allows one to identify some of the blood that may transmit hepatitis.

Furthermore, studies that have been done in recent years show that there is a higher incidence of hepatitis in blood from professional donors than in blood from volunteers.

So, putting all of our present knowledge together and eliminating all of the high risk routes, we can make a significant decrease in the risk of transmitting hepatitis. It is not possible at present, by any known test, to be sure that an individual will not get hepatitis from a transfusion or from other blood products.

Senator MAGNUSON. I asked a group of doctors at home in the Swedish Hospital. They said their problem was that sometimes they had to go to a blood bank and that it was pretty hard to tell what was actually there when the Red Cross group or somebody like that does the screening. I just use that as an example.

Dr. MARSTON. The Red Cross depends on volunteers.

The problem, quite simply, is that when a company goes out to buy blood, they get it from individuals who want to sell their blood. A high proportion, for instance, of drug addicts have found that this is a way they can make money. The incidence of hepatitis among drug addicts is higher because of the transmission through needles, and the risk of blood obtained that way is higher than the risk of blood obtained from volunteers.

Senator MAGNUSON. It is a matter of tighter screening, is it not?

Dr. MARSTON. In part, it is a matter of tighter screening. In part, it is a matter of identifying the source of blood as a high risk.

Senator MAGNUSON. Now, you mentioned a net increase of $9.6 million in child health and human development for family planning.

In the health services and mental health administration, we have $91 million for family planning, grants and contracts, and direct operations.

Is that an overlap, a duplication?

Dr. MARSTON. No, sir. We do family planning research.

The only part of family planning that we are involved in is the research. The HSMHA program is involved in the provision of family planning services.

Senator MAGNUSON. That research might furnish these other people with some guidelines?

COORDINATION OF FAMILY PLANNING ACTIVITIES

Dr. MARSTON. Yes, sir. There is at present in the Office of the Assistant Secretary a Deputy Director, Dr. Hellman, who has the specific job of coordinating the activities across the Department.

Senator MAGNUSON. This is limited to pure research?

Dr. MARSTON. For us, yes, sir.

Senator MAGNUSON. With their grants and contracts, they do some research and in the Office of Child Development we have $13 million for research in HEW. There are three places.

Dr. MARSTON. This is certainly one of the areas, Mr. Chairman, in which we have almost a maximum amount of coordination.

There is a weekly meeting of the program people at NIH and the Office of Child Health and HSMHA to talk about joint programs. I think the word "research" is being used in a different fashion.

Senator MAGNUSON. They have research and demonstration, $13 million. It was $5 million last year and $13.5 million this year.

Dr. MARSTON. You might have something called research on the distribution of information about contraceptives. That would not be the type of research that we are talking about. We are supporting the development of a more effective IUD or better understanding of the use of the hormones.

Senator MAGNUSON. As pure medical research.

Dr. MARSTON. Yes, sir. Dr. LaVeck is the Director.

Senator MAGNUSON. I know in three places the Department has family planning under Child Development; and in the Office of Child Development, they have $393 million. The big bulk there is Headstart. That is demonstrations they are talking about, I guess.

Now, on page 13, you say:

> For our regular research grant program, there is a net increase of $18.4 million in the budget. However, as an additional $23 million will be required to honor our moral commitments to ongoing projects, there will be a decrease of $4.6 million for new grants or the renewal of grants beyond their present commitment. There is also a $5 million reduction in the funds requested for the general research support grants, of which $2 million reflects the discontinuation of the health sciences advancement awards which were part of this program.

Now, how much is the total of the research grant program?

Dr. MARSTON. The total in 1972 proposed for our regular research is $505,034,000.

Senator MAGNUSON. Why would you not want to honor a renewal of grants, or why would you want a decrease of four million six for new grants?

Dr. MARSTON. The thing we are trying to do this year, Mr. Chairman, is to meet our moral commitments. At the time the Expenditure Control Act went into effect for the first time, NIH renegotiated downwards, on a grant-by-grant basis, the amount of support provided.

This has really been a particularly difficult problem. You make an award and you tell a man what to expect next year, and then you go back and tell him, "We are sorry; we were wrong. You are going to have less than that."

RESERACH GRANT AWARD COMMITMENTS

So, we have put a high priority on trying to get close to meeting our moral commitments. In order to do that, we are going to have to drop support for new grants from $150 million in 1971 down to $145 million in 1972.

It really is my decision that we would do better to try to get as close as we could to meeting these moral commitments.

We have three general types of grants. The first is the moral commitment to continuations—situations in which we made a grant last year—estimated that it would take 3 years to do the work, and said that funds would be available, if Congress appropriates them and if they are released.

The second type are grants to a new investigation or for a new project.

The third type is for an individual who may have done work on a project for 3 years and finds out it is going to take him another 2 or 3 years. He has to come back for an extension in open competition with all other competitive grants.

The last two, both the new projects and the competitive renewals, are in that line that shows a drop to $145,787,000 for 1972.

Senator MAGNUSON. I am only concerned that you don't chop somebody off without any particular reason because of lack of funds. We have had a lot of mail that this is a cut all up and down the line, even those who have grants.

I am hopeful that you will be able to, even with your review, looking them over, keep those commitments that you make.

Mr. MILLER. Mr. Chairman, I think Dr. Marston is saying that there is enough money in the budget to cover all our moral commitments.

The only place where there may not be enough to cover is where a person has finished his project and is competing with other people who are requesting support for new work.

But there is enough money in the budget to cover all of our moral commitments.

Senator COTTON. But you are cutting your new starts?

Mr. MILLER. That is right.

Dr. MARSTON. There will be less money available for the new starts and for those individuals whose grants have ended and who must compete in order to continue.

Senator MAGNUSON. There have been a lot of complaints to us.

I realize that maybe sometimes when a person is through, he does not quite think he is through on his project grant, or he wants to keep on going with something else. That does not give him necessarily a priority on going into another grant, another type of work?

Dr. MARSTON. No, sir. All of those to whom we have no commitment come into open competition for funds.

We put the priority, as you have indicated, on living up to our moral commitments, even though that requires a small decrease in the other category.

OUTSIDE WITNESSES

Senator COTTON. If you will pardon me, Mr. Chairman. We have been listening to the outside independent witnesses for several days. This year, as in other years, it seems that there are certain things that every one of them said. Of course, one thing is that their particular specialty is more important than anybody else's. I would not give a cent for them if they did not think so.

The other thing is that they are right on the verge of success; they have reached the point where in a short time the sun is going to shine and everything is going to open up and the problem will be solved, and that the Congress, the budget, and somebody else is stopping them just before the dawn.

That, I suppose, is natural enough, but are there—this may be an unfair question—but are there certain fields or certain specific areas of research where that generalization could be justified? It is pretty hard to tell, is it not?

Dr. MARSTON. Yes, sir; it is.

I would say this: Of all the items in the NIH budget that the area which has been the strongest is this one. This regular research grant program is by all odds the single most important part of the whole NIH budget.

The problem is that, although it is a large amount, it covers so many fields that it is hard to pick out everything that is being done.

Senator COTTON. You are talking about research resources?

Dr. MARSTON. No, sir; I am talking about the $505 million that we call our regular research grants program. This includes everything from the small project grant to the individual investigator up through some of our very large program project grants.

Every project supported under this heading has a primary characteristic that—in the best judgment of our study sections and advisory councils—it is among the best ideas that this country is able to come up with, and that it supports our best scientists through open competition.

In almost any other country in the world, there are complaints that maybe there is not a fair way of giving support, but in this country I think we have a generally accepted fair way for choosing the best projects from among all that come in for support.

Senator COTTON. On noncompeting, you have an increase.

Dr. MARSTON. In the noncompeting; yes, sir.

Senator COTTON. In competing, you have a slight decrease.

Dr. MARSTON. A slight decrease.

Senator COTTON. What is behind that.

Dr. MARSTON. This is a matter of matching the programs to the dollars available.

REDUCTION IN NONCOMPETING GRANTS

Senator COTTON. Why should the reduction be in the competing and all the advances in the noncompeting?

First, for the record, I am not sure I quite remember the fine distinction, what is the difference between a noncompeting and competing? It is obvious in the name what it means.

Dr. MARSTON. Noncompeting means that a judgment was made a year or 2 years or 3 years ago, that the research was going to take 2 or 3 or in some cases 4 or 5 years. During that period of time, although we get annual reports, the investigator doesn't come up as if he were applying for a new grant each year. But he may come up at the end of the project period and say, "This is what I have accomplished; now I am applying either for more funds or I am going to work in another area."

We say to him, on the award paper we send to him:

> You have $20,000 to support your work for 1969. We estimate it will take $18,000 for 1970. We estimate it will take $15,000 for 1971 and that it may take $12,000 for 1972. During that period of time, your job is to carry out this research with just the normal administrative reviews, but at the end of 1972 we have no commitment to you and if you haven't finished the work you will have to come back and compete with everybody else for support in 1973.

Senator COTTON. Do you have instances when you take away those grants, when the annual report indicated to you they were not making satisfactory progress? Do you have any instances when you stop that procedure?

Dr. MARSTON. We have an administrative review. We don't go through the whole scientific review unless there has been a major change. If an investigator or a key member of the team leaves or moves to another institution, then we reconsider what should be done about the award. We do this if a chief investigator died or he moves to another institution or if we knew he had drastically changed the direction of his research. The answer to your question is that there are some instances in which a grant is terminated.

But we try, insofar as we can, to recognize that it usually takes more than a year to do meaningful research and to give an indication that the investigator will get support for more than a year at a time.

Senator COTTON. You are not supposed to say so but in reply to a question you would like to see the competing as much as it was last year?

Dr. MARSTON. Yes, sir.

Senator COTTON. Actually, if you had as much as you had last year—of course, the Republican Party has stopped inflation, but it isn't visible yet—it will buy a little less.

Dr. MARSTON. Yes, sir.

Senator COTTON. I am speaking as a Republican.

You feel that that is the most important part that comes under your Department?

Dr. MARSTON. It is the most important and it is the one that is hardest to justify because research grants, as a budget category, do not have an appealing disease label though they are, of course, for research or disease. You understand, these grants are made by the individual Institutes. This is just a summary budget item here.

Senator COTTON. To whom do these grants go? To the universities?

Dr. MARSTON. They go to those individuals and groups who have a good track record and put forward the best proposals for work.

The only restraint is that they cannot go to profit organizations. We do not distinguish between a university and a nonprofit research institute. For research support to a profitmaking group, we use the contract mechanism.

Senator MAGNUSON. One thing that disturbs me about the grants is that you have so many approved, but unfunded in your list.

Dr. MARSTON. Yes, sir.

APPROVED, UNFUNDED GRANTS

Senator MAGNUSON. I want to put in the record at this point a table entitled "Growing number of unfunded regular program research grants, declining number of funded grants, shown in NIH 3-year tally," covering the years 1969, 1970, and 1972.

(The table follows:)

GROWING NUMBER OF UNFUNDED REGULAR PROGRAM RESEARCH GRANTS, DECLINING NUMBER OF FUNDED GRANTS, SHOWN IN NIH 3-YEAR TALLY

[Dollars are thousands]

	1969		1970		1971 estimate		1972 estimate	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Cancer:								
Funded	1,100	58,622	1,004	58,358	936	68,005	954	69,123
Unfunded	132	5,069	245	15,184	334	13,554	421	26,037
Heart:								
Funded	1,633	81,533	1,512	78,089	1,454	87,463	1,440	93,854
Unfunded	57	7,130	154	12,076	238	14,970	216	13,700
Dental:								
Funded	271	10,525	189	9,618	209	10,751	202	11,398
Unfunded	64	2,975	119	6,102	133	4,753	68	2,614
Arthritis:								
Funded	2,266	80,768	2,062	75,768	1,959	79,335	1,823	82,848
Unfunded	296	16,043	463	28,054	377	21,813	612	34,507
Neurology:								
Funded	1,437	50,290	1,314	46,929	1,267	49,651	1,166	48,887
Unfunded	93	4,850	120	11,573	255	14,832	374	17,940
Allergy:								
Funded	1,222	50,178	1,258	47,049	1,175	48,462	1,239	48,856
Unfunded	174	5,187	207	11,267	253	13,081	208	13,724
NIGMS:								
Funded	1,436	69,154	1,109	64,579	1,076	75,313	948	75,415
Unfunded	371	15,598	819	37,661	664	27,339	677	31,921
NICHD:								
Funded	867	35,231	799	37,910	732	41,890	760	45,279
Unfunded	328	11,399	414	17,455	583	24,281	678	30,600
NEI:								
Funded	355	13,436	353	14,487	427	18,492	500	21,443
Unfunded			53	4,664	24	2,100	64	3,264
NIEHS:								
Funded	103	5,094	88	4,525	87	5,445	131	7,937
Unfunded	17	1,138	42	2,482	85	4,052	25	1,253
Fogarty:								
Funded	49	111						
Unfunded								
Subtotal:								
Funded	10,739	454,962	9,688	437,312	9,322	484,807	9,163	505,040
Unfunded	1,532	69,389	2,636	146,518	2,946	140,775	3,343	175,560
NLM:								
Funded	46	1,321	34	990	20	590	17	600
Unfunded	6	154	9	404	2	310	5	500
BHM:								
Funded	98	4,754	78	4,251	81	4,611	69	4,214
Unfunded	7	358	3	151	8	255	8	228
Total NIH:								
Funded	10,883	461,037	9,800	442,553	9,423	490,008	9,249	509,854
Unfunded	1,545	69,901	2,648	147,073	2,956	141,340	3,356	176,288

Senator MAGNUSON. This indicates that even with the $505 million you will have $175 million total unfunded.

There is a breakdown of all the Institutes here. The unfunded seems to be about 35 to 40 percent in some cases. Why is that? Is that because of the time element involved in some of these grants?

Dr. MARSTON. No, sir. There are two points on this. The first is that we have never made the case that every grant that is approved should automatically be paid. In fact, even when we have had adequate funds to cover all approved grants, we required the bottom 10 percent to undergo a special additional review to be sure that support was justified. Even in an instance like the increase for the Cancer Institute, we will look very carefully before we use those increased funds to pay every grant that has passed our study section and our review process.

The second point is that the approved and unfunded grants give one an estimate of how much good work might be done if there were no dollar restraints.

Senator MAGNUSON. But with your estimate for 1972 of $505 million, you end up with $175 million to be unfunded?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. That is your estimate, that you are not going to fund $175 million?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. What is the use of having it in the bill if we are not going to fund it? Just so that it is there?

Mr. MILLER. Mr. Chairman, I don't think that the phrase "in the bill" is applicable in this instance.

The amount of money in the bill will fund the $505 million and we are telling you, because the committees are always interested in knowing, how much in additional grants will be approved for which there is no money.

Senator MAGNUSON. In order to fund all of them which you approved, we would have to put $175 million more; is that correct?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. I am glad to clear that up.

Of course, we might not want to fund each and every one of those because there are some that, as you say, you might have approved, conditions might have changed. You might review them again and decide not to fund them.

Dr. MARSTON. The bottom 10 percent, even if dollars were not a question, we would normally want to review again.

"TRANSFER" OF TRAINING FUNDS

Senator MAGNUSON. Now, on page 14 you mentioned transfer.

We have had a lot of testimony about transfer of funds out of NIH, and that this is a big steal from people who want to continue with the health manpower program and the budget, "You guys down at the Budget take the money away from me after you have appropriated."

I have heard it from all extremes. What about it?

Dr. MARSTON. I would say this has been the single most difficult thing to try to explain in this budget, Mr. Chairman.

I have had, I think, all of the experiences you have had in trying to explain the reasons for a proposed comparative transfer in which the dollars are to be used for the same purposes they were to be used for before.

I agree with you. This has been very heavily criticized by the outside community, and it has been very difficult to explain.

You do understand the purpose of it, though?

Senator MAGNUSON. Well, the purpose is to give a lump sum to the dean and the schools; was it not?

Dr. MARSTON. And to do it under such conditions so that the same number of trainees would be supported in the same field that they were supported in 1971.

Senator MAGNUSON. Is the reason for the complaints that they don't want to go to the dean and plead their case, they would rather come to NIH?

Dr. MARSTON. I think the biggest reason for the complaints has been that it has created a lot of confusion about what the basic purpose was. Some see it as a move to use funds for nonresearch purposes.

The biggest complaint is that it has been difficult to have people understand really what was intended here. There has been a great deal of suspicion that something was being attempted other than the reasons that were given.

Senator **Magnuson**. I do not know whether the suspicions are correct but there will be some monkey business going on whether you can help it or not and we will have to hear about that later.

I must agree with you, there is a great deal of confusion about it.

Dr. **Marston**. That is right. I think that has been the main thing.

HEALTH MANPOWER BILL

Senator **Magnuson**. Now, you mentioned the health professions, the health manpower bill. That is in conference so we don't know what will come out of that.

Dr. **Marston**. That is right.

Senator **Magnuson**. I think it is safe to say that the House and Senate are not too far apart. It will be at least next Wednesday or Thursday and I get the word here they hope to finish the conference.

Now, I have to ask this question and I am glad to ask it because I am going to get a phone call here some time this week.

Is the Hill National Center in good shape, budgetwise?

Dr. **Marston**. I would like to have Dr. Cummings come up to the table, or you can question him when he testifies later on.

Senator **Magnuson**. Just say if you have sufficient funds. I am going to have to answer this phone call, you know. I am going to have to say, "Yes; there are sufficient funds, Lister". Or, can you say they are adequate?

Dr. **Marston**. I cannot answer that because of the broad scope of what is envisioned in the development of the Lister Hill Center of Biomedical Communications. There is no question that it has been caught in the dollar squeeze that all the other programs we have been talking about, with a few exceptions, have been caught in.

Senator **Magnuson**. We will take a look at it and see.

One last question for me and I have to run, too, until this afternoon's session.

NATIONAL LIBRARY OF MEDICINE

We have had some pretty potent testimony that we ought to add—how much—to the Library of Medicine? Not a large amount; it ranged from $1 million down to $300,000 or $400,000. Two or three Senators have been deeply interested in it.

Of course, the librarians got hold of our good friend, Dr. Luther Terry, and he came up and testified they thought they needed some. I don't know that they need the full million but they ought to have a little more. I think in that case we will wait to hear Dr. Cummings and see where we are on that figure. They made an awfully good case.

Dr. **Marston**. As I pointed out, there is an increase in this budget.

Senator **Magnuson**. Senator Cotton, do you have some further questions?

Senator **Cotton**. Just two or three very brief questions.

Senator **Magnuson**. I have to go. After Senator Cotton finishes, we will recess until 2:30 this afternoon and then we will take up the Institutes one by one.

Senator COTTON. The outside witnesses we have been listening to noted that only in two cases have the Institutes been reduced. One is the National Institute of Neurological Diseases and Stroke, and the other is the National Institute of the General Medical Sciences.

Have you any comment?

Dr. MARSTON. The reduction in general medical sciences is related largely to the fact that it has such a large part of the fellowship programs.

The differences between, say, a $231,000 increase for biological standards and $2,900,000 decrease in neurology is a small one.

The thing I want to say is that there has been no intention on the part of NIH or the administration to focus on these two Institutes. In general, there have been small increases in all areas with the exception of cancer and child health and environmental health. They are the ones that have the larger budget increases.

I don't think I have any more comment on that, Senator Cotton.

Senaor COTTON. In other words, you have placed the emphasis where it seems most necessary.

In the latter part of your statement, you mention manpower to some extent.

I have had some letters, one is very well stated, back in my State complaining about the cutting in psychiatric manpower training.

Mr. MILLER. That comes under the National Institute of Mental Health, Mr. Chairman, which is another part of the bill.

Senator COTTON. Yes; but is not some of it in one of these Institutes?

Dr. MARSTON. No, sir; it used to be in the past.

Senator COTTON. The chairman has gone through your statement with you most carefully and answered most of our questions. We will reserve the balance of our questions for the individual representatives of the various Institutes.

However, I am interested in the conclusion in your statement. You say:

> I am satisfied that this is not only a good budget but that it provides for a real resumption of the initiative in the research area and that the amounts requested—and the purposes for which they are requested—will greatly stimulate progress both in health research and in the provision of adequate health manpower.

Now, that does not mean that you are completely satisfied with each allocation?

Dr. MARSTON. No, sir.

Senator COTTON. If there were any particular allocations it could be slightly increased without taking away any allocations to the Insitutes?

Would you care to indicate where they would be most desirable?

PROGRAM-BY-PROGRAM ANALYSIS

Dr. MARSTON. The type of analysis that we do under these circumstances is to look at it program by program rather than each appropriation as a whole.

I would be glad to supply you whatever information you need on possible growth areas. I would not be able to pick out, with all of my Institute Directors sitting around me——

Senator COTTON. I understand your embarrassment.

Dr. MARSTON. I don't want to be facetious on something that is as important as this.

Senator COTTON. I understand the situation.

Dr. MARSTON. When we put together an NIH budget, it is on the basis of the best judgment of the scientific opportunities in the specific areas. We don't get into the business of trying to look at one appropriation versus another.

The general problem is that there are areas in which we are involved in increasing program activities that result in putting particular squeezes on other important program activities.

My guess is that some of these will come up as we talk about the individual Institutes this afternoon.

Senator COTTON. As a matter of fact, if, after this committee has listened to all the individual Institutes, if we have some notion, even though half-baked, about some particular point that appeals to us, I assume that before we mark up we could then ask you for the benefit of your judgment?

Dr. MARSTON. Yes, sir.

Senator COTTON. Because we might well go completely astray and be wrong.

On the other hand, there might be something that we would want to do.

We can leave it that way.

In view of the fact that I was unfortunately not able to be with you from the beginning, did you talk about the kidney situation at all?

Dr. MARSTON. No, sir; we have not. We will be prepared this afternoon to do that.

SUBCOMMITTEE RECESS

Senator COTTON. Fine.

Thank you.

We will resume in this room at 2:30.

The committee stands in recess.

(Whereupon, at 12:05 p.m., the subcommittee was recessed, to reconvene at 2:30 p.m.)

(AFTERNOON SESSION, 2:30 O'CLOCK, TUESDAY, JULY 20, 1971)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NATIONAL INSTITUTES OF HEALTH

BIOLOGICS STANDARDS

Justifications

Appropriation Estimate

BIOLOGICS STANDARDS

To carry out sections 351 and 352 of the Public Health Service Act pertaining to regulation and preparation of biological products, and conduct of research related thereto, [$8,838,000] *$8,956,000.*

Amounts Available for Obligation

	1971	1972
Appropriation	$8,838,000	$8,956,000
Real transfer to:		
"Departmental Management"	-19,000	---
Real transfer from:		
"National Institute of Arthritis and Metabolic Diseases" (Proposed transfer for increased pay costs)	150,000	---
"National Institute of Neurological Diseases and Stroke" (Proposed transfer for increased pay costs)	308,000	---
Comparative transfer to:		
"Office of Director"	-28,000	---
"National Institute of Environmental Health Sciences"	-135,000	---
"Research Resources"	-94,000	---
"Health Manpower"	-295,000	---
Total obligations	8,725,000	8,956,000

Obligation by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
9	Biologics standards (Total obligations).	273	$8,725,000	273	$8,956,000	---	+$231,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions....................	273	273	---
Full-time equivalent of all other positions..............	5	5	---
Average number of all employees....................	268	268	---
Personnel compensation:			
Permanent positions..........	$3,189,000	$3,379,000	+$190,000
Positions other than permanent..................	48,000	49,000	+1,000
Other personnel compensation.....................	71,000	73,000	+2,000
Subtotal, personnel compensation............	3,308,000	3,501,000	+193,000
Personnel benefits............	309,000	317,000	+8,000
Travel and transportation of persons......................	122,000	122,000	---
Transportation of things.......	15,000	15,000	---
Rent, communications and utilities....................	50,000	53,000	+3,000
Printing and reproduction......	10,000	10,000	---
Other services:			
Project contracts............	1,933,000	1,933,000	---
Payment to NIH management fund......................	1,555,000	1,605,000	+50,000
Other........................	416,000	391,000	-25,000
Supplies and materials.........	922,000	929,000	+7,000
Equipment.....................	85,000	80,000	-5,000
Total obligations by object....................	8,725,000	8,956,000	+231,000

Summary of Changes

1971 estimated obligations	$8,725,000
1972 estimated obligations	8,956,000
Net change	+231,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	---	---	---	+$148,000
2. Within-grade pay increases	---	---	---	+70,000
3. FTS rate increase	---	$8,000	---	+3,000
4. Extra day of pay in 1972	---	---	---	+10,000
B. Payment to "National Institutes of Health management fund" for centrally furnished services	---	1,555,000	---	+50,000
Total, increases	---	---	---	+281,000
Decreases:				
A. Program:				
1. Direct operations	273	7,162,000	---	-50,000
Total, decreases	---	---	---	-50,000
Total, net change	---	---	---	+231,000

Explanation of Changes

Built-in increases -- These increases will provide: $148,000 for annualization of 1971 pay increase costs; $70,000 for within-grade pay increases in 1972; $3,000 for increased cost for using the Federal Telecommunications System and $10,000 for an extra day of pay in 1972.

Direct operations -- The decrease of $50,000 is to reduce supply, equipment and other services items.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act Section 301-Research and Investigation, in general	Indefinite	$8,956,000
Title III, Part F-Licensing-Biological Products	Indefinite	8,956,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the conduct of research is included in Section 301 of the Public Health Service Act.

The Public Health Service Act, Title III, Part F, Subpart I - Biological Products --

Sec. 351. (c) Any officer, agent, or employee of the Department of Health, Education, and Welfare, authorized by the Secretary for the purpose, may during all reasonable hours enter and inspect any establishment for the propagation or manufacture and preparation of any virus, serum, toxin, antitoxin, vaccine, blood, blood component or derivative, allergenic product, or other product aforesaid for sale, barter, or exchange in the District of Columbia, or to be sent, carried, or brought from any State or possession into any other State or possession or into any foreign country, or from any foreign country into any State or possession. (d) Licenses for the maintenance of establishments for the propagation or manufacture and preparation of products described in subsection (a) of this section may be issued only upon a showing that the establishment and the products for which a license is desired meet standards, designed to insure the continued safety, purity, and potency of such products, prescribed in regulations, and licenses for new products may be issued only upon a showing that they meet such standards. All such licenses shall be issued, suspended, and revoked as prescribed by regulations, and all licenses issued for the maintenance of establishments for the propagation or manufacture and preparation, in any foreign country, of any such products for sale, barter, or exchange in any State or possession shall be issued upon condition that the licensees will permit the inspection of their establishments in accordance with subsection (c) of this section.

Sec. 352. (a) The Service may prepare for its own use any product described in section 351 and any product necessary to carrying out any of the purposes of section 301. (b) The Service may prepare any product described in section 351 for the use of other Federal departments or agencies, and public or private agencies and individuals engaged in work in the field of medicine when such product is not available from establishments licensed under such section.

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental Management	-$19,000	To establish the Facilities Engineering and Construction Agency.
Real transfer from:		
National Institute of of Arthritis and Metabolic Diseases	150,000	Proposed transfer for increased pay costs.
National Institute of Neurological Diseases and Stroke	308,000	
Comparative transfer to:		
National Institute of Environmental Health Sciences	-135,000	To provide an equitable distribution of the Management Fund in 1972.
Research Resources	-94,000	
Health Manpower	-295,000	
Office of the Director	-28,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director.

Biologics Standards

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1964	$4,817,000	$4,787,000	$4,787,000	$4,787,000
1965	4,969,000	4,969,000	4,969,000	4,969,000
1966	6,406,000	6,406,000	7,206,000	6,806,000
1967	7,905,000	7,904,000	7,904,000	7,904,000
1968	8,649,000	8,649,000	8,649,000	8,649,000
1969	8,499,000	8,499,000	8,499,000	8,499,000
1970	8,225,000	8,225,000	8,225,000	8,239,000
1971	8,640,000	8,838,000	8,838,000	8,838,000
1972	8,956,000			

Justification

Biologics Standards

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	273	$3,617,000	273	$3,818,000	---	+$201,000
Other expenses...........	---	5,108,000	---	5,138,000	---	+30,000
Total..............	273	8,725,000	273	8,956,000	---	+231,000

General Statement

Biologics Standards was officially established in 1955 as a Division of the National Institutes of Health charged with administering a program for the control of biological products in interstate commerce and for the conduct of a program of related research.

Program Plans for 1971 and 1972

The major program objectives of this Division are to keep abreast of the latest research advances and to maintain progress in testing and control techniques. The attainment of these objectives is essential to assure the safety, purity, and potency of biological products used for the prevention, diagnosis, and/or treatment of human disease.

The Division staff is involved in the following control and regulatory areas:

Licensing of manufacturing establishments and biological products -- Presently there are 235 establishments licensed with 113 subsidiaries and 260 blood bank donor centers representing 1,251 product licenses. These establishments are inspected at least annually to assure high quality in the manufacture of the 263 licensed products and to determine that prescribed standards are being met. Over 40 members of the scientific staff serve as inspectors.

Examination of manufacturer's protocols and performance of control tests -- Each protocol submitted is reviewed by knowledgeable scientists to determine if the manufacturer's test results conform to established standards. Depending upon the products, these protocols are reviewed and evaluated by various expert staff members.

Control tests are conducted on eight thousand samples per year prior to release of the products for use. Additionally, tests are performed on random samples obtained at the time of inspection. These chemical, sterility, general safety, pyrogen, residual moisture and potency tests are also conducted on biological products submitted in support of license applications. Total tests performed annually exceed 31,000.

Another very important facet in the release and/or licensing of a product is the review of labelling. Careful and critical examinations of all labels and package inserts are made to ascertain whether they comply with regulations pertaining to nomenclature, expiration dates set for each individual product, dosage, methods of use, warnings as to possible hazards, etc.

Reference standards -- Biological standards, reference and control materials, and reagents necessary for the testing of products to determine compliance with standards are developed, maintained and distributed. Approximately 14,000 of these standards were made available.

Investigational New Drugs -- The scientific staff participates in the evaluation of "Notices of Claimed Investigational Exemption" for new biological products. Presently, there are 294 active cases which are being monitored. Information contained in these "Notices" indicates to the Division the paths in which research should be directed for the purpose of obtaining knowledge to be used in developing Regulations.

Investigations -- Infractions of the law and regulations occur occasionally and must be investigated promptly. These investigations are conducted by specially trained inspectors from the Office of the Director and usually require extensive interviews in the course of assembling complete and accurate evidence. Since these investigations frequently involve other Government Agency jurisdictions, continuing liaison is maintained with the Justice Department, Customs Bureau, Department of Agriculture, Post Office Department, Federal Trade Commission, and the Food and Drug Administration.

These inspectors also conduct special studies in such areas as the practice of blood donation to determine the extent of inaccurate donor identification, too-frequent blood donations, and hepatitis incidence.

Regulations -- Scientific staff of each laboratory, according to their area of scientific activity, participate in the drafting of regulations for new products and amendments of regulations to reflect advances in science and technology. The efforts involved in the acquisition of the information needed to develop written standards are extensive and often time-consuming and based upon an active research program conducted by the Division. When a new vaccine appears achievable, the Division strives to develop standards that will be ready at approximately the time the product is brought to the final stages of manufacture and evaluation. It is necessary during this period to maintain close contact with the manufacturers and with scientists working in the particular field, so that problems related to standards can be rationalized during the developmental phases.

Inspections -- It is estimated that there are some 100 major firms who are currently providing source material such as serums, plasma or blood to licensed manufacturers - manufacturers of biological products under the so called "short supply provisions" of the regulations. Most of these firms were established essentially to serve this purpose and operate without license, and with a minimum of supervision, collecting large volumes of plasma from paid donors by a procedure called plasmapheresis.

Presently, it is incumbent upon the licensed manufacturer to register these facilities with the Division and to assure himself through written agreements, inspections, and tests performed on the source materials that all applicable regulations relating to the manufacturing of his final licensed product have been complied with by the "short supplier."

To provide more standardized and consistent supervision it is deemed desirable for the Division to require that these establishments be subjected to the same licensing procedures and direct supervision now required for other manufacturers who engage interstate sale, barter or exchange of biologics. This would add to the work load of the Division.

Research:

The research program of the Division is focused on improving methods for measuring potency and efficacy and for assuring the purity, potency, and safety of all biological products both established and new. Because the Division's interests in this area are of such scope only a few examples of current endeavor are set forth below:

Adjuvants -- Studies are being conducted on mineral and vegetable oils and aluminum adjuvants by Division scientists and others to examine their purity and safety for use in man.

These immunologic adjuvants are substances which are incorporated in vaccines and toxoids to enhance the immune response to these antigens. Adjuvants may increase or prolong the production of antibody. A variety of substances have been used as adjuvants in man and animals. The adjuvants which have been most commonly used in man are aluminum compounds such as alum, aluminum phosphate or aluminum hydroxide. Mineral and vegetable oil adjuvants incorporating emulsifiers and stabilizers have been used in water-in-oil emulsified antigens only under conditions of clinical investigation. These latter adjuvants have not received approval for general use in man in the United States as the long term safety of oil adjuvants has not yet been established.

Hepatitis -- Hepatitis has long been a problem because of the seriousness of disease, particularly following blood transfusion and lack of effective control measures. Investigators in the Division have had an important role in a series of hepatitis research investigations during the past two years. Studies here and elsewhere have demonstrated that two or more agents bear an etiologic relationship to acute hepatitis. Progress to-date has been with an antigen (termed hepatitis-associated antigen) which is thought to be the virus responsible for "serum hepatitis" or closely related to it. Standards for reagents to be used for the detection of this antigen have recently been published.

Diploid cells -- The Division is supporting research contracts on cell strains used in the production of viral vaccines. The research is directed towards the development of non-human diploid cell strains. To date, two promising strains have been developed and are being made available for further evaluation to interested virologists and commercial establishments. If further studies indicate that they are acceptable, it is anticipated that these cell strains could be used in vaccine production.

Current programs will continue into 1972 with emphasis dependent upon future developments by manufacturers and the scientific community.

The increase of $231,000 includes $148,000 for annualization of 1971 pay increase costs; $70,000 for within-grade pay increases; $3,000 for increased cost in 1972 of using the Federal Telecommunications System; $10,000 for an extra day of pay in 1972 and $50,000 for research-related services and support furnished through the National Institutes of Health Management Fund. These increases are partially off-set by several minor decreases totaling $50,000.

Program Purpose and Accomplishments

Activity: Biologics standards. (Public Health Services Act, Title III, Part F)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
273	$8,725,000	Indefinite	273	$8,956,000

Purpose: Activities include establishment of standards for preparation of biologics, testing of vaccines and their preparation and research related to development, manufacture, testing and use of vaccines and analogous products.

Explanation: Exercises controls on the safety, purity, and potency of biological products through a system of licensing of manufacturing establishments and of products which involves control testing, label review, annual inspections and investigations. Related research is product-oriented. The appropriation's funds are for direct operations.

Accomplishments in 1971: The blood-clotting factor essential for the control of hemophilia was made commercially available. Standards were developed by the Division and the first license has been issued. Progress has been made with a hepatitis-associated antigen and a product is expected to be licensed in 1971. Annual inspections were performed at 235 licensed establishments together with 113 subsidiaries and 260 blood bank donor centers. Control tests were conducted on eight thousand product samples prior to release of these products for general use.

Objectives for 1972: Current programs will continue at approximately the same level with specific emphasis dependent upon future developments by both the scientific community and manufacturers.

Division of Biologics Standards

STATEMENT OF DR. RODERICK MURRAY, DIRECTOR

ACCOMPANIED BY GEORGE BRUST

SUBCOMMITTEE PROCEDURE

Senator Cotton. The subcommittee will come to order. The chairman will be here shortly, but we will get going because you people have been kind enough to be punctual and we don't want to penalize you for it. The chairman has asked me to start off. He will be here.

First, we want to call on each of the Directors of the various Institutes to give us a summary, about 3 minutes or so, in order that we may know what each Institute is doing, what the increases or decreases are in the budget estimate for the various research programs and the purposes for them, and also to answer any questions we may have.

Can we do that in 3 minutes? You will have 3 minutes and the committee has unlimited time. So we will go right down the list.

Dr. Murray?

DIVISION RESPONSIBILITIES

Dr. Murray. Thank you, Senator.

The Division of Biologics Standards, as we have noted in the past, is concerned with the development of standards for safety of biological products, vaccines, and so forth.

HEPATITIS: DEVELOPMENT OF STANDARDS FOR MATERIALS TO DETECT AUSTRALIAN ANTIGEN

I would like to mention a few items that have been of concern to the Division during the past year and will be during the immediate future.

Dr. Marston, in his testimony, indicated that a great deal of work was being done in the field of hepatitis, in various components of NIH, and gave a perspective on research work. Our own effort is directed toward the development of standards for materials to detect the Australia antigen and thus contribute toward the abatement of the problem of hepatitis.

So far this year we have adopted regulations for the reagents and three commercial firms have been licensed for the product and more are in the works. When these reagents become generally available, it will be a requirement that all blood entering interstate commerce for general distribution will have to be negative with respect to this antigen.

DIPLOID CELLS

One other area on which we have spent considerable effort and which I would like to bring to the committee's attention is the improvement in the subtrates used for the production of virus vaccine. We have been engaged for some years in the development of a program of growing diploid cells of subhuman primate origin, with a view to having vaccines which are free of undesirable viral agents.

BUDGET REQUEST

As far as the budget of the Division is concerned, we are requesting $8,956,000 in 1972 as compared with $8,725,000 available for obligation in 1971. This will enable the program to continue at the same level of operation and the increase of $231,000 will be applied to mandatory cost items.

Senator COTTON. By "mandatory," you mean wage increases, and so forth?

Dr. MURRAY. Yes, sir.

DBS—FDA

Senator COTTON. What is the reason for maintaining the Division of Biologics Standards in the National Institutes of Health, and not in the Food and Drug Administration? What kind of relationship do you have with the Food and Drug Administration?

Dr. MURRAY. We have a very good relationship with the Food and Drug Administration. We are in constant communication with them on common problems. The reason it is in the National Institutes of Health is that that was the way it was set up originally by Congress. It antedated the Food and Drug Administration. At one time, it was administered out of the office of the Director of the NIH. Its tasks are heavily based upon a research background primarily in the field of microbiology.

Senator COTTON. Does the Food and Drug Administration engage in research too?

Dr. MURRAY. It does engage in research, but I think the extent to which it engages in research may not be of the same ratio as we do.

Senator COTTON. You were there first and have continued; that is about the story?

Dr. MURRAY. That is correct.

Senator COTTON. I think I understand, but I want the record to show rather clearly what division there is between the ground covered by you and by the Food and Drug Administration.

Dr. MURRAY. We can readily provide this.

(The information follows:)

Apparent similarities between the method of control of biological products and of drugs in general often call for comment.

The Division is responsible for establishing and maintaining standards of quality and safety of all biological products that come within the jurisdiction of the Public Health Service. These products include all vaccines, antitoxins, therapeautic serums, allergenic products, and human blood for transfusion, as well as products prepared from human blood. There are presently 263 biological products licensed, all of which are under constant surveillance and study by the DBS.

The Federal licensing control of biological products, originally enacted in 1902, introduced a concept of control which substantially differed from the control techniques initiated for drugs in general by the enactment of the Pure Food and Drug Act of 1906. These differences were based primarily on the character and inherent potential danger of the products involved. For biological products, major emphasis was placed on control at the manufacturing level through a system of licensing and inspection, while the Pure Food and Drug Act of 1906 placed emphasis on the finished product after it had been introduced into the channels of commerce.

The concentration of control of licensed biological products continues at the manufacturing level in contrast to control directed to the finished product. These differences were recognized in Section 130.2 of the Food and Drug Administration's New Drug Regulations which exempt products licensed under the Public Health Service Act from the new drug provisions of the Food and Drug laws. The control of biological products is a complex matter which leans heavily on the sciences of microbiology, virology, bacteriology, immunology, biochemistry, and hematology. On the other hand, the control of other drugs depends on analytical chemistry, toxicology, and pharmacology. Proper control of biologics can be exercised only from a broad base of on-going scientific programs in these disciplines, and is directed towards the solving of manufacturing and testing problems in scientific terms rather than on a basis of enforcement alone.

HEPATITIS

Senator COTTON. You mentioned hepatitis. What progress are you making in its control, and how much of your budget this coming year do you intend to spend on that particular phase of your work?

Dr. MURRAY. The figure will be approximately $550,000, which is coming out of our general budget.

Senator COTTON. Did you use about that amount last year?

Dr. MURRAY. Yes, sir.

Senator COTTON. It is about the same as last year?

Dr. MURRAY. Yes, sir. I must point out this has been at the expense of other operations.

Senator COTTON. What progress are you making?

Dr. MURRAY. We think considerable progress has been made. We look forward to being able to require within a matter of months, perhaps within the next 6 months, that all blood collected for blood transfusion or for the preparation of blood products under Federal license will be negative for Australia antigen. In this way, according to the information we have been able to gather ourselves and obtain from the general literature, we will reduce the amount of hepatitis by 20 to 25 percent. It is not a complete answer, but it will be a marked reduction.

Senator COTTON. That is, your real activity is keeping it out of the blood that is used for transfusion?

Dr. MURRAY. That is our activity.

Senator COTTON. But you are studying the disease?

Dr. MURRAY. Only incidentally. Our main responsibility is the development of standards for this particular product used in this test. Incidental to that, we must obtain information on the disease, on its etiology and the effect that it has.

Senator COTTON. You study the disease and research it with the idea of preventing it or curing it.

Dr. MARSTON. This involves a number of areas of NIH in addition to the Division of Biologics Standards. The national blood resources program of the National Heart and Lung Institute is involved in the hepatitis problem. The National Institutes of Allergy and Infectious Diseases and Arthritis and Metabolic Disease have active programs. The NIH Clinical Center itself, as a user of blood products, is also involved.

TASK FORCE ON HEPATITIS

This program has covered so many of the Institutes, Senator, that I have had an overall NIH task force looking into it. I would like to add a further observation, that this is one of those remarkable but not rare instances in the history of science where an individual working at NIH on a completely unrelated problem found this unusual agent in the blood of aborigines in Australia. It has turned out to be the best lead we have found in the hepatitis field. He was not working in hepatitis at all when he made the initial discovery.

Senator COTTON. That is interesting, because this has been a rather mysterious disease, has it not?

Dr. MARSTON. Yes, sir. It has been very hard to get a handle on the disease at all, because we did not have a method like this to be able to identify blood which contained the antigen. There are still many questions to be answered.

Senator COTTON. I recall that almost 40 years ago I had it, only they called it jaundice.

Dr. MARSTON. Yellow jaundice.

Senator COTTON. I had an attack which lasted only 3 or 4 days or a week. I gave blood all through World War II. It wasn't until a few years ago that someone asked me if I had ever had it. I said yes, and they stopped taking my blood. Every time I have had a physical checkup and have given that fact, they ask me all about whether I have had gall bladder trouble, and everything else.

Apparently it just came and went with no cause or effect afterwards. So that all through the years it has been a rather mysterious disease.

So I just want to nail this down—is all the additional money for fiscal 1972 all for housekeeping expenses?

Dr. MURRAY. It does not represent increased program activity.

Senator COTTON. Thank you, Dr. Murray.

NATIONAL INSTITUTES OF HEALTH

NATIONAL CANCER INSTITUTE

Justifications

Appropriation Estimate

NATIONAL CANCER INSTITUTE

For expenses necessary to carry out title IV, part A, of the Public Health Service Act, [$230,383,000] *$234,338,000.*

Amounts Available for Obligation

	1971	1972
Appropriation	$230,383,000	$234,338,000
Real transfer to:		
"Departmental Management"	-28,000	---
Real transfers from:		
"National Institute of Neurological Diseases and Stroke"	+1,879,000	---
"National Institute of General Medical Science"	+898,000	---
(Proposed transfer for increased pay costs)		
Comparative transfers to:		
"Office of the Director"	-151,000	---
"John E. Fogarty International Center for Advanced Study in the Health Sciences"	-22,000	---
"Research Resources"	-27,000	---
"Health Manpower"	-2,470,000	---
Total, obligations	230,462,000	234,338,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
27	Research...........		$95,411,000		$97,403,000		+$1,992,000
	General research support grants		(5,901,000)		(5,275,000)		(-626,000)
	Scientific evaluation grants..		(201,000)		(201,000)		---
	Specialized research centers		(19,453,000)		(20,953,000)		(+1,500,000)
	Leukemia research support centers		(1,851,000)		(1,851,000)		---
31	Fellowships........		3,798,000		3,348,000		-450,000
34	Training...........		8,358,000		8,358,000		---
	Direct operations:						
36	Laboratory and clinical research	473	20,518,000	476	21,529,000	+3	+1,011,000
38	Collaborative research and development......	771	97,419,000	778	98,301,000	+7	+882,000
53	Review and approval of grants........	110	3,321,000	110	3,636,000	--	+315,000
54	Program direction..	56	1,637,000	56	1,763,000	--	+126,000
	Total obligations....	1410	230,462,000	1420	234,338,000	+10	+3,876,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions	1,410	1,420	+10
Full-time equivalent of all other positions	54	54	---
Average number of all employees	1,441	1,472	+31
Personnel compensation:			
Permanent positions	$19,013,000	$20,536,000	+$1,523,000
Positions other than permanent	464,000	464,000	---
Other personnel compensation	229,000	244,000	+15,000
Subtotal, personnel compensation	19,706,000	21,244,000	+1,538,000
Personnel benefits	2,000,000	2,154,000	+154,000
Travel and transportation of persons	995,000	998,000	+3,000
Transportation of things	140,000	145,000	+5,000
Rent, communications and utilities	595,000	613,000	+18,000
Printing and reproduction	473,000	480,000	+7,000
Other services:			
Project contracts	79,235,000	78,943,000	-292,000
Payment to NIH Management Fund	10,672,000	11,159,000	+487,000
Other	3,279,000	3,589,000	+310,000
Supplies and materials	4,150,000	4,254,000	+104,000
Equipment	1,650,000	1,650,000	---
Grants, subsidies and contributions	107,567,000	109,109,000	+1,542,000
Total obligations by objects	230,462,000	234,338,000	+3,876,000

Summary of Changes

1971 estimated obligations	$230,462,000
1972 estimated obligations	234,338,000
Net change	+3,876,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of new positions in 1971	---	---	---	+$319,000
2. Annualization of 1971 pay increase costs	---	---	---	+946,000
3. Within-grade increases	---	---	---	+384,000
4. Extra day of pay	---	---	---	+66,000
5. FTS rate increase	---	---	---	+18,000
6. Non-competing continuation grants	---	---	---	+2,643,000
B. Program:				
1. Research grants	---	$95,411,000	---	+2,000,000
2. Laboratory and clinical research	473	13,097,000	+3	+408,000
3. Collaborative research and development	771	95,468,000	+7	+2,281,000
4. Review and approval	110	2,164,000	---	+50,000
5. Program direction	56	1,494,000	---	+50,000
C. Payment to "National Institutes of Health Management Fund" for centrally furnished services	---	10,672,000	---	+487,000
Total, increases	---	---	+10	+9,652,000
Decreases:				
A. Program:				
1. Research grants	---	95,411,000	---	-2,651,000
2. Fellowships	---	3,798,000	---	-450,000
3. Laboratory and clinical research	473	13,097,000	---	-175,000
4. Collaborative research and development	771	95,468,000	---	-2,500,000
Total, decreases	---	---	---	-5,776,000
Total, net change	---	---	+10	+3,876,000

Explanation of Changes

Built-in Increases--These increases will provide: $319,000 for annualization of new positions in 1971; $946,000 for annualization of 1971 pay increase costs; $384,000 for within-grade pay increases in 1972; $66,000 for extra day of pay in 1972; $18,000 for increased costs in 1972 of using the Federal Telecommunications System; and $2,643,000 for the continuation costs in 1972 of those grants funded in 1971.

Research grants--The program increase of $2,000,000 represents an increase of $500,000 in the regular research grant program for an expanded research effort concerning viruses as cause of cancer and an increase of $1,500,000 in specialized research centers for the establishment of one or two new centers in geographical areas where none now exists. The program decrease of $2,651,000 represents a decrease of $2,025,000 in the regular research grant program which will result in an overall reduction in on-going programs and a decrease of $626,000 in general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships--The program decrease of $450,000 will still allow for support of 142 postdoctoral and special fellowships and 74 career award and career development fellowships.

Laboratory and clinical research--The program increase of $408,000 and three new positions will provide for a modest expansion in immunology research related to virus and is directed towards applying recent advances to the treatment and prevention of cancer in man. The program decrease of $175,000 will result in an overall reduction of on-going programs.

Collaborative research and development--The program increase of $2,281,000 and seven new positions will provide for a modest expansion of effort in the Special Virus Cancer Program to identify viruses directly involved in the causation of cancers in man and to develop effective vaccines or other means for the prevention and control of human cancers. The program decrease of $2,500,000 is in the radiation therapy area, however, this is not a decrease of effort since the 1971 obligations of $3,000,000 were for initial development of the Mary Hitchcock Cancer Research Center. An amount of $500,000 is included in this budget which will cover the operational cost of the center for 1972.

Review and approval--The program increase of $50,000 will provide funds for program management in connection with the additional funds provided for regular research grants and specialized research centers.

Program direction--The program increase of $50,000 will provide funds for the support of contracts to assist in the further development of program planning and computer applications to the research programs of the Institute.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or to be Taken
1971 House Report	
1. The Committee again heard convincing testimony on the need for expanded work on cancers caused by chemicals. The Committee has received from the Institute plans for an expanded effort in research on causation of cancers by chemicals and hopes that these plans will be promptly put into effect along with the planned studies on causation involving both viruses and chemicals.	1. Plans furnished to the Committee relative to a Chemical Carcinogenesis Program are being followed to the extent that resources are available.
2. The Committee was much encouraged by the continuing improvement in treatment for many forms of cancers. Much of this success is directly attributable to the Institute's Cancer Chemotherapy program. The Committee looks forward to the extension of the chemotherapy program into research on the more common, slow growing cancers.	2. With additional funds included in the 1971 appropriation for the National Cancer Institute, the Chemotherapy program can be extended into more research on the common, slow growing cancer. Special report requested on this subject by the Committee has been furnished.
1971 Senate Report	
1. The Committee was advised that progress continues to be made in exploring the role played by viruses in causing various forms of cancer. The Committee was pleased to note that the 1971 President's Budget and the increase allowed by the House included additional funds for this important activity.	1. The 1971 appropriation included an increase of $22 million to exploit the exciting leads and opportunities in the virus area. With the passage of the appropriation, expansion of this field can now be effected. Special report requested on this subject by the Committee has been furnished.
2. While the improvements of treatment are gratifying, the Committee was quite concerned about the rising mortality rate and an even faster rise in new cancer cases. The Institute has plans for an expanded program aimed at prevention of cancers and has launched initial activities under this plan. The Committee feels that these efforts aimed at preventing cancer should be accelerated as much as practicable as a means of halting the rising incidence.	2. Causes of cancer are related to chemicals and possibly viruses. Plans have been developed and furnished to the Committee relative to expansion of the Chemical Carcinogenesis Program. These plans are being followed to the extent that resources are available.

Item	Action Taken or to be Taken
1971 Senate Report--continued	
3. The Committee felt that steps should be taken to establish cancer centers in parts of the country that do not yet have ready access to such a facility so that advances in cancer research can be most quickly and effectively brought to bear on the treatment and care of patients.	3. Increases provided in the 1971 appropriation will allow for the initiation of additional cancer research centers. The 1972 budget also includes $1.5 million for this purpose, as explained in the written justification portion of this budget.
4. The Committee was informed that an additional $3 million would be needed for the development of a center at the Mary Hitchcock Memorial Hospital in Hanover, New Hampshire.	4. The House-Senate Conferees agreed that $3 million of the 1971 NCI appropriation shall be for the development of a cancer center at the Mary Hitchcock Memorial Hospital at Hanover, New Hampshire. Negotiations are now underway to award a contract for this purpose.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act Section 301-Research and Investigation, in general	Indefinite	$234,338,000
Title IV, Part A--National Cancer Institute	Indefinite	234,338,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in Section 301 of the Public Health Service Act.

The Public Health Service Act, Title IV, National Research Institutes,

Part A, National Cancer Institute--

"Sec. 401. The National Cancer Institute shall be a division in the National Institutes of Health."

"Sec. 402. In carrying out the purposes of section 301 with respect to cancer, the Surgeon General, through the National Cancer Institute and in cooperation with the National Advisory Cancer Council, shall--

(a) Conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of cancer;

(c) Provide training and instruction in technical matters relating to the diagnosis and treatment of cancer;

(d) Provide fellowships in the Institute from funds appropriated or donated for such purpose;"

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental Management	-$28,000	To establish the Facilities Engineering and Construction Agency.
Real transfers from:		
National Institute of Neurological Diseases and Stroke	+1,879,000	Proposed transfer for increased pay costs.
National Institute of General Medical Science	+898,000	Proposed transfer for increased pay costs.
Comparative transfers to:		
Office of the Director	-151,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director.
John E. Fogarty International Center for Advanced Study in the Health Sciences	-22,000	To provide an equitable distribution of the NIH Management Fund in 1972.
Research Resources	-27,000	To provide an equitable distribution of the NIH Management Fund in 1972.
Health Manpower	-54,000	To provide an equitable distribution of the NIH Management Fund in 1972.
Health Manpower	-2,416,000	Transfer of institutional support funds to Health Manpower.

National Cancer Institute

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$117,167,000	$125,672,000	$160,000,000	$142,836,000
1963	139,109,000	150,409,000	158,409,000	155,742,000
1964	145,114,000	144,340,000	145,114,000	144,340,000
1965	139,714,000	138,970,000	148,970,000	148,970,000
1966	153,968,000	157,618,000	163,768,000	163,768,000
1967	163,957,000	170,656,000	175,656,000	175,656,000
1968	183,356,000	183,356,000	192,356,000	183,356,000
1969	187,707,000	182,592,000	191,592,000	185,149,000
1970	180,725,000	180,725,000	200,000,000	190,486,063
1971	202,383,000	227,383,000	235,383,000	230,383,000
1972	234,338,000			

Justification

National Cancer Institute

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	1,410	$21,706,000	1,420	$23,398,000	+10	+$1,692,000
Other expenses.........	---	208,756,000	---	210,940,000	---	+2,184,000
Total............	1,410	230,462,000	1,420	234,338,000	+10	+3,876,000

General Statement

The National Cancer Institute conducts, fosters and assists research and training directed toward preventing, diagnosing, treating and controlling cancer in man. These objectives are pursued directly within government laboratory and clinical facilities and through universities, non-profit research organizations and commercial concerns supported with grants and contracts and include both laboratory and clinical studies.

Despite continuing improvements in the results of therapy, cancer mortality is increasing at a rate that cannot be explained entirely by population increase or increasing average age. About one in four persons will get cancer and two-thirds of those afflicted will die with the disease. Approximately 335,000 Americans will die of cancer in 1972; this is one death every 1 1/2 minutes. Clearly the burden of cancer causing factors still outweighs our present capabilities for curing cancer.

Cancer is no respecter of age, color, or economic status. Yet, the disease's most severe toll is levied on the urban poor. This is a harsh circumstance caused by a number of factors including exposure to environmental and occupational pollutants, financial status, and quality of available medical care. Provision of care of cancer patients constitutes an enormous drain on medical care resources, and the best treatment, which is not universally available, can only be provided by a system that includes highly trained specialists, extensive paramedical support, and modern and expensive facilities.

However, continuing progress against cancer and the reversal of the trends of increasing incidence and mortality depend not only on more effective and comprehensive delivery of care but also on the nature of the measures applied. The first line of defense against cancer lies in prevention. It is becoming abundantly clear that cancer initiation in man depends on a complex interrelation of external factors, including viruses and chemicals, and internal factors such as genetic makeup. Organization of the information flowing from the intensive research of past years now permits us to visualize more clearly specific measures by which certain forms of cancer may be prevented. The link between certain chemicals and the genesis of human cancers has been established. Additional opportunities for more rapid identification of carcinogenic chemicals, for characterizing the nature of human exposure to such materials and for diminishing the hazard of such substances have been identified.

Although the causative link between viruses and human cancers has not been definitely established, the nature of the interrelation between viruses and hosts is becoming progressively clearer as is the nature of the preventive measures that may be developed. Success in answering the questions that still exist depend to a large extent on vigorous prosecution of a carefully-planned, integrated, targeted effort now underway.

The second line of defense lies in the effective treatment of human cancer. In terms of the time required for many cancers to develop and evolve in the host, cancer is a chronic process. Moreover development, administration and evaluation of cancer preventive measures is a lengthy process. Even with development and use of a broad spectrum of effective preventive techniques, heavy reliance must be placed on therapy for many years. The use of drugs in the treatment of certain forms of cancer has been increasingly successful, and now points the way for more effective treatment of other cancer forms. Opportunities for progress in this field can be visualized and await vigorous exploitation.

The network of cancer centers supported by the National Cancer Institute constitutes a resource for the conduct of many important clinical and fundamental research activities. Centers represent a further potential not only for generation of new knowledge but also, by standing at the interface of research and practice, have a great potential for benefiting large numbers of actual and potential cancer patients. The Institute continues to seek and realize opportunities for strengthening this system.

The justification that follows supports the President's Budget for the National Cancer Institute of $234,338,000 and does not support the $100,000,000 proposed increase for Cancer Research Initiatives. The justification of this special initiative in cancer research is being handled separately.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research Projects...............	$68,005,000	$69,123,000	+$1,118,000
Special Programs................	27,406,000	28,280,000	+874,000
Total Research Grants.......	95,411,000	97,403,000	+1,992,000

Introduction

The research grant program of the National Cancer Institute, stimulates and supports a basic and applied research effort in the broad areas of causation, diagnosis, treatment, prevention and control of cancer. These programs cover a full spectrum of activity, ranging from single objective research projects to broadly based multidisciplinary program centers.

Program Plans in 1971 and 1972

In basic research, emphasis is being placed on projects of known or potential relevance to cancer, including radiation, chemical carcinogenesis, the nature of cancers and their interactions with host organisms, immunology, drug development, and epidemiology. Studies involving a variety of cancers in laboratory animals, human patients, and in selected populations will be continued as well as those projects attempting to identify cancer-producing agents in air, water, food, tobacco, drugs, and other related aspects of mankind's total environment.

To elucidate the causes of cancer along with achieving control of the many manifestations of this disease, a concerted effort will be made to capitalize on new concepts, leads, and approaches involving the interactions between cancer viruses and their natural hosts, and between viruses and chemicals.

There will be further studies on the techniques of therapy, such as the effect of drugs and radiation in controlling the growth and spread of cancerous cells in living organisms. Clinical investigations of new and complex anticancer therapies will continue to be carried out in approximately 250 institutions across the nation. The investigators at these institutions are presently organized in 23 cooperating groups on the basis of the therapy under study, e.g., pediatrics, urology, etc.

In conjunction with the cooperative therapeutic research program, the Institute will continue to support investigations into the control and treatment of the two major causes of death in cancer--hemorrhage and infection. The control of hemorrhage is being studied by approximately 28 investigators receiving Leukemia Research Support Center funds. The control of infection is being actively pursued at three institutions where the complicated "life island" and even more complex "laminar flow" techniques are under investigation. These procedures attempt, by physical and chemical means, to produce a germ-free environment for the patient during the periods of greatest susceptibility to infection. Although the "Protected Environment" program is beginning to demonstrate beneficial effects, further elucidation of these benefits will be sought during the coming year. In addition, plans have been made to alter the direction of this program to provide more clear-cut answers to the problem of infection.

In 1972, the program decrease of $2,651,000 includes $626,000 for general research support grants and $2,025,000 in the regular research grant program. The decrease in the regular research grant program will result in an overall reduction in on-going programs with the exception of the efforts in virus research. The Program increase of $500,000 requested in the virology program will be used to support new research in virology where indications are that transformation, at least on the part of small DNA tumor viruses, results from the attachment of one or more viral genes to cellular genes. Activities relating to the identification of these genes, their mode of attachment and how this results in transformation will be pursued.

In the area of cooperative clinical cancer research, development will continue at about the same total dollar level in the following programs: (1) brain tumor studies, (2) the fast neutron source now under development, (3) a pion beam study, (4) the immunotherapy of malignant diseases, (5) the intensive combined therapy of breast cancer, (6) radical versus simple mastectomy in breast cancer, and (7) the development of a biostatistical and data processing and coordinating center for the program.

The Institute currently supports 33 Specialized Research Centers which are performing intensive, highly specialized clinical research on cancer in man. The role which man's environment plays, as related to his susceptibility to malignant disease from viral and chemical carcinogenesis agents, will continue to be studied, with the ultimate goal being prevention. Studies on radiation biology, physics, and nuclear medicine will expand. Prime emphasis will continue to be given to determining the optimum methods of employing chemotherapeutic drugs, and other forms of therapy and to the use of radiation as an adjuvant to surgery and chemotherapy. The currently active centers are predominantly located in the northeastern part of the United States, with few or none at all in many parts of the south, midwest and far west. The program increase of $1,500,000 in special programs will be used to initiate one or two new cancer research centers in geographical areas where centers do not exist at this time.

The leukemia research support centers will continue at the same dollar level in 1972 as 1971. It has been demonstrated that the use of platelet transfusions is efficacious in the treatment of bleeding due to an imbalance of platelets within the body. Emphasis is now being placed on delineating the best conditions of platelet isolation and processing for maximum yield, and to elucidate those situations in which platelet transfusions will be most effective in achieving the desired therapeutic goal.

Research Grants Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
Fields			
Carcinogenesis............	$16,680,000	$17,059,000	+$379,000
Cancer biology............	15,504,000	15,947,000	+443,000
Pharmacology.............	8,153,000	8,190,000	+37,000
Epidemiology.............	1,061,000	1,066,000	+5,000
Radiation................	3,557,000	3,573,000	+16,000
Surgery..................	1,817,000	1,826,000	+9,000
Immunology...............	4,897,000	5,053,000	+156,000
Chemotherapy.............	6,326,000	6,354,000	+28,000
Basic research and other[1].	10,010,000	10,055,000	+45,000
Subtotal regular program.	68,005,000	69,123,000	+1,118,000
General research support grants..................	5,901,000	5,275,000	-626,000
Scientific evaluation grants..................	201,000	201,000	---
Specialized research centers.................	19,453,000	20,953,000	+1,500,000
Leukemia research support centers.................	1,851,000	1,851,000	---
Total research grants..	95,411,000	97,403,000	+1,992,000

---

[1] Includes Sloan-Kettering Single Instrument grant.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Noncompeting continuations........	648	$45,316,000	655	$47,959,000	+7	+$2,643,000
Competing projects.....	354	20,589,000	299	19,064,000	-55	-1,525,000
Supplementals.........	(153)	2,100,000	(139)	2,100,000	(-14)	---
Subtotal regular program...........	1,002	68,005,000	954	69,123,000	-48	+1,118,000
General research support.............		5,901,000		5,275,000		-626,000
Scientific evaluation..........		201,000		201,000		---
Specialized research centers.............		19,453,000		20,953,000		+1,500,000
Leukemia research support centers......		1,851,000		1,851,000		---
Total research grants..........		95,411,000		97,403,000		+1,992,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total fellowships...............	$3,798,000	$3,348,000	-$450,000

Introduction

Several kinds of awards designed to meet particular objectives are granted under this program. The program provides research training to individuals whose career development extends from the immediate postdoctoral period through the advanced stages of scientific attainment. Postdoctoral awards are made to qualified individuals with doctoral degrees and up to three years of relevant research experience. Special fellowships are for those who have had at least three years of postdoctoral research or professional experience, or who have completed at least three years of residency training in a clinical specialty. Special fellowships may also be awarded to senior investigators who wish to undertake additional training e.g., that during sabbatical leave periods.

This program also supports two other types of awards made to institutions - research career development awards and research career awards. Research career development awards support investigators who require five to eight years of experience to improve their research skills and develop a capability for independent investigation. Research career awards have been made to established investigators of high quality for a protracted period of their research careers.

Program Plans in 1971 and 1972

The Fellowship program will continue to provide training to promising young investigators in cancer research. As in past years emphasis in 1972 will continue to be given to the shortage areas of medicinal and organic chemistry, epidemiology, radiation therapy, surgery, hematology, and clinical pharmacology.

Funds requested for 1972 will provide for 216 awards, compared to 242 in 1971, a decrease of 26.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting........	110	$2,144,000	106	$2,100,000	-4	-$44,000
Competing...........	39	415,000	22	323,000	-17	-92,000
Supplementals.........	--	---	--	---	--	---
New awards............	93	1,239,000	88	925,000	-5	-314,000
Total fellowships....	242	3,798,000	216	3,348,000	-26	-450,000

Fellowships (By Type of Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Postdoctoral..........	98	$796,000	95	$796,000	-3	---
Special...............	50	701,000	47	701,000	-3	---
Development awards.....	83	1,970,000	63	1,520,000	-20	-$450,000
Career awards.........	11	331,000	11	331,000	--	---
Total fellowships....	242	3,798,000	216	3,348,000	-26	-450,000

Fellowship Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
Fields			
Carcinogenesis..............	$841,000	$742,000	-$99,000
Cancer biology..............	1,612,000	1,421,000	-191,000
Pharmacology................	434,000	382,000	-52,000
Epidemiology................	57,000	50,000	-7,000
Radiation...................	160,000	142,000	-18,000
Surgery.....................	25,000	25,000	---
Immunology..................	483,000	423,000	-60,000
Chemotherapy................	186,000	163,000	-23,000
Total fellowship program..	3,798,000	3,348,000	-450,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total training grants............	$8,358,000	$8,358,000	---

Introduction

Graduate research training grants provide support for trainees in the various fields related to cancer research and underwrite expenses for equipment, supplies, and training staff. Clinical cancer training grants are awarded to qualified institutions to provide training in the prevention, diagnosis, treatment, rehabilitation, and public health aspects of cancer.

Program Plans in 1971 and 1972

Approximately 587 full-time equivalent trainees will be supported in 1971 through 141 training grants. Emphasis will be placed on continuing training programs in disciplines where cancer researchers are in short supply, such as radiation therapy, clinical pharmacology, chemical carcinogenesis, epidemiology and training related to regional medical programs.

The estimate for 1972 will provide for 125 training grants which is 16 below the 1971 level of 141. This relates to a decrease of 61 full-time equivalent trainees.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting........	118	$7,321,000	96	$6,420,000	-22	-$901,000
Competing...........	23	1,037,000	29	1,938,000	+6	+901,000
Supplementals.........	--	---	--	---	--	---
Total training grants............	141	8,358,000	125	8,358,000	-16	---

Training Grants (By Type of Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Graduate..............	74	$4,906,000	66	$4,906,000	-8	---
Cancer clinical training............	67	3,452,000	59	3,452,000	-8	---
Total training grants..........	141	8,358,000	125	8,358,000	-16	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	473	$7,261,000	476	$7,753,000	+3	+$492,000
Other expenses.........	---	13,257,000	---	13,776,000	---	+519,000
Total.............	473	20,518,000	476	21,529,000	+3	+1,011,000

Introduction

The mission of the General Laboratories and Clinics area of the Institute is to obtain information and knowledge for the understanding of the fundamental biological processes underlying cancer in man through the conduct of research in the biomedical sciences. The research of the General Laboratories and Clinics is carried out in 11 units. Five are in the basic sciences; namely Biology, Cell Biology, Molecular Biology, Biochemistry, and Physiology. Six are engaged in clinical research programs of Surgery, Immunology, Radiation, Dermatology, Pathology, and Metabolism and have 68 hospital beds to complement these clinical programs. The scientists and physicians of these 11 units are conducting studies broadly described by the title of their unit. Their research is designed to add to our knowledge about the changes caused by cancer, whether they be in the biochemistry of the cell or the effect of cancer upon the patient. They include studies of the treatment of cancer by surgery, chemical and radiological means.

Program Plans in 1971 and 1972

Malignant (cancer) cells differ from their normal counterparts - they can grow locally beyond the bounds limiting the normal counterparts; they can be transported and grow in distant sites. The shape of the cancer cell and size and shape of its nucleus are often sufficiently different so that cancer cells can be recognized by structural criteria; they can also be readily recognized by when they grow in remote sites. The properties of the malignant cells that permit them to grow locally out of control and to spread to distant sites are not known. The mechanisms by which a cancer drains resources from the rest of the body are also not known.

These large gaps in our understanding of the whole cancer problem require a broad attack upon the disease. This attack ranges from a study of the processes involved in translating information in the cell nucleus in the form of DNA to operations within the cell by enzymes. This is a facet of molecular biology, and how the cell functions is biochemistry. The Laboratories of Molecular Biology and Biochemistry are engaged in research involving normal cells and cancer cells. The Laboratory of Biology's Tissue Culture Section has played a leading role in developing the techniques of tissue culture. A number of General Laboratories and Clinics units are studying the antigens of tumor cells, and attempting to develop methods of utilizing them properly to create new therapeutic tools. These therapeutic studies are at an early developmental stage. This area of research is growing rapidly, its ultimate role is to be determined. At present, GL&C is engaged in pursuing several lines of research in immunology and immunotherapeutics, both in man and the experimental animal.

Studies in patients range from those designed to improve radiation therapy and surgery as therapeutic tools together with those designed to determine how a cancer affects the patient, how anemia is produced, and why host defenses to bacteria are reduced. Of particular significance is the possibility that immunological techniques may offer new ways of making an earlier diagnosis of cancer of the bowel.

This broadly based program to study cancer in man and experimental animals by a team comprised of physicians and scientists in a variety of specialties and disciplines has led to the development of newer methods of treatment and has provided new knowledge about cancer, that will permit better care of patients and an increased understanding of the fundamental aberration that results in cancer.

The program decrease in 1972 of $175,000 will result in an overall reduction of on-going programs with the exception of research in the virus program. The program increase of 3 positions and $408,000 will permit a modest expansion in immunology research as related to virus. This is needed to apply advances in immunology to the treatment and prevention of cancer in man. Research in tumor immunology has arrived at a level that warrants an intensive effort in this direction. Immunologic defects contribute to the development of some tumors, while in other circumstances immunologic factors may play an important role in controlling cancer. It has been demonstrated that tumors in animals can be prevented by immunization or by bolstering the immune system.

In addition to the program change, there is an increase of $778,000 which includes $57,000 for annualization of new positions in 1971, $312,000 for annualization of 1971 pay increase costs, $135,000 for cost of within-grade pay increases, $22,000 for extra day of pay in 1972, and $252,000 for payment to the National Institutes of Health Management Fund for centrally furnished services.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	771	$11,971,000	778	$12,909,000	+7	+$938,000
Other expenses..........	--	85,448,000	--	85,392,000	--	-56,000
Total..............	771	97,419,000	778	98,301,000	+7	+882,000

Introduction

The programs under Collaborative Research and Development include national efforts utilizing the research contract mechanism as well as investigations carried on directly in Government laboratories and clinical facilities, to concentrate on major cancer problems. The interrelated research projects under this activity are coordinated within programs involving integration of multi-discipline research attacks. They are continually critically assessed and modified as research findings accumulate in these targeted programs conducted by the Institute.

The Institute established the Etiology and Cancer Therapy areas under this activity to provide strong central leadership and responsibility for carefully planned research activities. The Etiology programs are focused on causes of cancers and their occurrence patterns and prevention. The Therapy programs are concerned with finding the best methods of treating cancer through the screening, testing and clinical evaluation of drugs.

The Breast Cancer and Lung Cancer Task Forces comprise the Cancer Task Forces area. Planned programs initiated from these activities tend to cut across organizational lines and are dependent on a variety of on-going activities within the Institute.

The following table indicates level of support by major program areas:

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Etiology.................	408	$54,731,000	415	$57,581,000	+7	+$2,850,000
Cancer Therapy...........	294	31,582,000	294	31,881,000	--	+299,000
Task Forces..............	15	4,068,000	15	4,079,000	--	+11,000
Cancer Research Center...	--	3,000,000	--	500,000	--	-2,500,000
Supporting Services......	54	2,087,000	54	2,153,000	--	+66,000
National Institutes of Health Management Fund	--	1,951,000	--	2,107,000	--	+156,000
Total Collaborative Research and Development..........	771	97,419,000	778	98,301,000	+7	+882,000

Etiology

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Total..................	408	$54,731,000	415	$57,581,000	+7	+$2,850,000
Office of the Scientific Director.	25	1,056,000	25	1,084,000	--	+28,000
Special Virus Cancer..	187	4,416,000	194	5,002,000	+7	+586,000
Contracts...........	--	34,091,000	--	36,101,000	--	+2,010,000
Carcinogenesis........	105	2,373,000	105	2,548,000	--	+175,000
Contracts...........	--	8,081,000	--	8,031,000	--	-50,000
Demography...........	91	1,680,000	91	1,794,000	--	+114,000
Contracts...........	--	3,034,000	--	3,021,000	--	-13,000

Introduction

The Etiology Area is charged with responsibility for the major share of the Institute's programmed research on cancer causation and prevention. In order to develop methods of prevention and treatment of human cancers, research is directed toward identification of causative agents (viruses and/or chemicals) in defined human and animal populations which are at different risks to cancer. These investigations include fundamental studies on the mechanisms by which these agents produce abnormal alterations in living systems. Scientists are responsible not only for their individual research but also for provision of strong central leadership and management of a broad, multidisciplinary and integrated programmatic attack upon these problems. The overall goal of the Etiology Area is prevention and control of cancer in man. Specific studies toward this goal are conducted by contract with investigators throughout this country and abroad and through the in-house laboratories of the Sections and Branches of the three major areas of Etiology--Carcinogenesis, Demography, and Viral Oncology.

Program Plans in 1971 and 1972

Special Virus Cancer Program (SVCP)

The Viral Oncology area of the National Cancer Institute has responsibility for planning, implementing, and managing all programmed research on viruses in relation to cancer. The Special Virus Cancer Program's primary objectives are: (1) To determine whether viruses comparable to those known to induce cancers of laboratory and domestic animals are causative agents of human cancers, and (2) to develop therapeutic and preventive measures (including vaccines) for control of human cancers when such causative agents are found. Since the beginning of the Program in 1964, the Institute has developed an effective science management program which has made substantial progress toward determining the virus causation of such human cancers as leukemia, lymphomas, sarcomas, and carcinomas. Despite this progress, the overall death rate from cancer continues to rise. The probability is very high that a virus or viruses are responsible for many of these new cases and that these viruses will be identified in the very near future, thus making it possible to take measures for the prevention or control of these cancers in man. These predictions are based largely on recent findings through work conducted within and in collaboration with the SVCP of the National Cancer Institute.

Because many scientists are convinced that an effort to identify viruses or to detect virus expression in human tumors is one of the best approaches to the solution of this aspect of the cancer problem, the SVCP has developed a targeted research and management apparatus which effectively musters the scientific talent available worldwide in a highly effective pursuit of research leads.

The administrative mechanisms and scientific operations of the SVCP provide a flexible program which can respond to changing research needs and exploit new leads that emerge through the efforts of the SVCP and other laboratories throughout the world. Recently, new biochemical and immunological approaches aimed at understanding cancer induction by viruses at the subcellular (or genetic) level have provided basic information which may aid the physician in detecting and treating cancers earlier than would otherwise have been possible. These new areas will be expanded and refined during the coming years as part of the continuing effort in the overall program to pursue important new scientific findings and to modify the program as research progresses.

Cancer is the second leading cause of death in the United States. The outlook for the prevention or control of some of these diseases is very bright. The following areas represent promising leads, new hypotheses, and/or new techniques with unusual significance for determining the role of viruses in human cancer:

(1) Herpes-type viruses (one of which is the EB virus) have been implicated in cervical cancer, post-nasal carcinoma, Burkitt's lymphoma, Hodgkin's disease, and perhaps chronic myeloid leukemia.

(2) Virus particles resembling the RNA agents (Type B), which cause breast cancers of mice, have been observed in milk specimens from women with breast cancers, and healthy women of high risk populations (e.g., inbred Parsi sect of India).

(3) Certain cancer-causing viruses are unable to produce malignancies unless a second "helper" virus is present, thus suggesting that under certain conditions tumor induction may involve the interaction of more than one viral agent.

(4) Certain tumor-inducing chemicals as well as irradiation may act as co-factors in activating latent cancer-causing viruses within cells.

(5) New evidence strongly suggests that sarcomas of children are produced by viruses resembling Type C of the RNA animal tumor viruses. These diseases of bone and muscle together with leukemia constitute the most important cause of death from cancer in the young.

(6) A dramatic breakthrough in the investigation of biochemical pathways of tumor virus infection and replication has been the demonstration that RNA viruses contain enzymes called polymerases which direct the synthesis of genetic material in the host cell. This discovery not only opens the way to a total understanding of the subcellular (molecular) events which occur as a cell becomes malignant but also may provide effective new approaches to cancer treatment.

Very recently a naturally occurring herpes virus which causes Marek's disease in large numbers of chickens has been isolated. Two vaccines have already been developed which provide virtually 100 percent protection to the flocks. When one relates this to the finding of herpes-type viruses in certain cancers in man and non-human primates, we can understand the excitement that has been generated. Successful prevention of virus-induced cancers may be one of the single most important findings with relevance to cause and prevention of cancer in man since the recognition of cancer viruses in the early 1900's. The relationships are so clear that NCI and the scientific community believe plans should be developed to produce and test vaccines, conventional or otherwise, for use in man. It is anticipated that the virus program will soon have sufficient information to decide on whether production of a vaccine is feasible. Additional time would probably be required before actual field testing. It would take four to seven years to determine the effectiveness of a vaccine because of the probable latent period of the disease.

It appears that a number of tumors are induced by hereditary information (RNA) derived from a virus which in its fully expressed form appears on electron microscopy as a virus particle. Yet, under many conditions the virus is covert and cannot be detected directly as a complete virus. Nevertheless, the hereditary information which carries with it the potential to produce cancers is transmitted from one generation to the next, apparently through the germ cells. Under certain laboratory conditions or with treatment by certain chemicals or radiation, this genetic information is expressed, sometimes producing virus or other characteristics detectable in the laboratory, and sometimes producing cancer itself. It is extremely important to find as soon as possible whether this route of cancer causation occurs in man and the extent to which this mechanism applies to the more than one hundred different types of human cancer. This is particularly important, since the means for controlling and preventing such cancers will be determined from this information. This may be accomplished not only by vaccination, but also by developing inhibitory agents (drugs, anti-enzymes, etc.) which block any or all of the various steps required in the sequence of events within the cell, beginning with infection by a tumor virus or activation of latent virus and culminating in malignant transformation.

To explore fully all new leads and approaches in investigating the role of viruses in human cancer, it is necessary to develop a capability for conducting field studies in populations on the natural ecology and for expanding related laboratory capabilities. These studies require highly skilled manpower to perform and correlate massive testing programs with epidemiological findings, and to provide the logistics to acquire large amounts of carefully produced and monitored sources of susceptible cells, tissues, sera, and viral diagnostic reagents. Successful production and purification of several different isolates of the herpes-type virus, the Type C and Type B viruses, from human cancers make it possible to determine the amount of virus or antibody to the virus in selected human populations. Following these studies we will know whether the virus, virus antigen, or specific antibody are consistently and predominantly associated with leukemia, lymphoma, and solid tumors, and/or whether the amount of these factors is significantly different from that of normal and diseased controls. Other basic studies in animals will be required for meaningful research on viruses and interactions of viruses with chemical carcinogens. This necessitates controlled environmental facilities for rearing animals and protecting them from extraneous infections during experiments. The complexities and the cost of these studies and logistics are substantial.

The program increase of seven positions and $2,281,000 in 1972 will permit the Special Virus Cancer Program to undertake and exploit the many promising and exciting research leads currently recognized by the scientific community. The principal areas of emphasis and major opportunity for advancing the program in 1972 are:

(1) The determination of cancer-causing activity in animals by viruses already isolated from human cancers.

(2) Relating this activity, and other characteristics of the candidate viruses, to cancer in man.

(3) The determination of the entire sequence of molecular events, including specific enzymatic activities (e.g., polymerases) in viral replication and tumor induction.

(4) Relating this information to the control of cancer in man.

Carcinogenesis

The Carcinogenesis Area is responsible for planning, implementing, and managing the Institute's coordinated research program on the occurrence of cancer in man following exposure to chemical and physical agents in the environment, and on the prevention of these cancers. The program accomplishes its objectives through three main approaches: (a) identification of cancer hazards for the human population, which includes selection, animal testing and evaluation of types of tobacco smoke, pesticides, air pollutants, industrial chemicals, food additives, drugs, natural products, and other agents; (b) development and definition of animal and cellular models for bioassay and for the study of the controlling factors in the genesis of specific tumor types (e.g., lung cancer, colon cancer, bladder cancer, endocrine cancers); selected animal models are standardized for use in screening bioassays of environmental chemicals; and (c) research aimed at identifying key processes in the host tissues and cells required for the development of cancers, and exploitable as a basis for inhibitory or preventive measures capable of minimizing the occurrence of cancers in man.

Plans to accomplish the objectives outlined above and recognized as national needs, have been formulated by the Carcinogenesis Area, and the highest priority activities in this plan are being implemented through an integrated intramural and contract-supported program.

Long-term animal testing will be continued to screen potential environmental cancer-causing agents (carcinogens) at a rate of at least 150 materials per year, or a greater number if additional resources become available. Even this increased screening effort, however, covers only a small portion of the thousands of chemicals now in the environment and awaiting testing as well as the thousands newly introduced into the environment every year. The first systematic approach to select the top priorities for such testing is being developed.

The development of biologic models for carcinogenicity studies will continue at an increased rate, as will efforts to document the degree of human relevance characteristic of these systems. The progress obtained in the Lung Cancer Program recommends extending a similar program orientation to other organ-specific types of cancer. It is planned that this organ-related approach will be extended to develop extensive program segments on colon cancer and on other organ systems such as the bladder, the pancreas, and the endocrine-related organs. The resulting definition of organ-specific animal cancer models will provide an essential resource for specialized bioassay of suspected causative agents for those cancer types in man, and the means for identifying and developing preventive measures at the host's level. Continued efforts will be made toward the establishment of data collection and retrieval systems to improve efficiency in coordinating information generated by the program and disseminating it to the scientific community. A newly developed Bioassay Data System for storage and retrieval of bioassay data will be given an extensive field trial.

Studies will continue on molecular processes, cellular responses, and immunological and biochemical mechanisms related to the control of neoplastic transformation and tumor growth. The recognition of enzyme mechanisms, controlling the activation of environmental carcinogens at the target-cell level, will be further defined. Immune control of carcinogenesis is going to be further exploited in the direct context of chemical carcinogenesis models. Other basic research leads, considered to have a high potential for the development of protective measures against cancer induction, will also be pursued. They include mechanisms for control of nucleic acids metabolism, for repair of genetic damage induced by carcinogens in target cells, and for selective control of protein synthesis. The identification of chemical-viral interaction mechanisms is given a high priority. Besides their basic value in the understanding of the genesis of cancer, these studies will also be essential for identifying the susceptible individuals in a population, most likely to develop certain forms of cancer.

A Special Lung Cancer Program in the Carcinogenesis Area is providing a definition of factors responsible for the pathogenesis of this most important type of cancer in man. The role of various chemicals and dusts in the induction of lung cancer is being tested. New biologic models are used to correlate tissue reactions in animals to those observed in the respiratory tract of man. Biological tests for the evaluation of the potential carcinogenic effects of marijuana smoke have begun and will be continued. Studies of the role of tobacco smoke components in lung cancer induction (which may lead to formulation of a less hazardous cigarette) represent a significant segment of the Carcinogenesis Program: these activities are funded mostly by the Lung Cancer Task Force and are described under the heading "Cancer Task Forces".

The Carcinogenesis Program will be continued at the same dollar level as 1971.

Demography

The Demography area has three major functions: (a) Research into the etiology of cancer in free-living populations, largely but not exclusively human; (b) development of the basic data of cancer incidence, prevalence, and mortality in the United States; (c) consultation and support in mathematics, statistics (including experiment design and analysis), and system analysis in problems of cancer research. The two branches and one special unit within the Demography area supplement and support each other in these activities.

Cancers not of genetic and familial concentration likely derive from the environment. There is growing evidence that the great majority of cancers have strong environmental components. These cancers fall into two groups: those related to a way of life (diet, habits, environment), and those related to occupations. In the studies of the Japanese, English, Norwegian and Polish migrants to the United States, a strong trend has been set for the migrants and their children to move toward patterns of cancer similar to those in the new country. For example, colon cancer is rare in Japan. Among the Japanese in Hawaii the rates are 4-5 times higher than in Japan, and compare closely to the rates for the white population. Whether this pattern is related to adoption of diet of the new country or to the new environment and its pollutants is not known. Diet is also being studied. One study, for example, is the role of dietary contributions to changing breast cancer patterns and to determine reasons for the increase in breast cancer incidence among women under the age of 55.

Cancers not preventable through manipulation of environment require the identification of high-risk persons and their early diagnosis. One early-diagnosis project, the use of mammography for the detection of breast cancer, has resulted in a 40 percent reduction in mortality from breast cancer in women screened by this technique. Other possible high-risk groups include persons having above average exposure to pesticides, chemicals, or radiation.

Because childhood cancer offers a field of investigation not clouded by smoking habits, certain diseases (not yet contracted), or occupational hazards, analyses of the 30,000 death certificates in the National Registry of Childhood Cancer Deaths will be pursued, to clarify the observed concurrence between specific congenital defects and cancer. The Register also helps identify familial clusters of cancer that could denote a hereditary tendency.

There is a strong indication that cells of people from "cancer families" have an increased susceptibility to malignant transformation that can be measured in the laboratory. If this implies increased personal susceptibility and if cancer derives from an interaction of environmental risk and personal susceptibility, identifying susceptibles and then protecting them from exposure could prevent much disease.

These genetics or hereditary studies are augmented and complemented by similar studies of domestic animals. Analysis of animal disease data will continue in expectation that the more than 50,000 case records (all diseases) now reviewed annually will yield information on the origin of cancer in animals and thereby speed the identification of factors responsible for cancer in man. The animal disease register also permits testing hypotheses that relate to the possible transmissibility of cancer from animals to man.

Following the major emphasis on prevention and early detection is treatment. Support to developing and evaluating new cancer therapy is provided by the compilation of major trends in results of cancer treatment in the United States and by the development of mathematical models to guide the planning and evaluation of experimental cancer therapy in man. Some studies in cancer of the prostate, breast cancer and lung cancer are leading toward finding the characteristics of patients who do well in contrast to those who do badly.

The Third National Cancer Survey moved into full data collection in 1970 and will continue through 1971 in ten metropolitan areas across the United States, two States, and Puerto Rico. The Survey will provide up-to-date information on cancer incidence, prevalence, and some indexes of the economic and societal impact of cancer from approximately one-quarter million cancer cases in the Survey area.

The functions described above will continue at the same budgetary level in 1972, but potential for expansion is great. To be able to continue the Third National Cancer Survey, consultative service will be limited and some planned studies on pesticides and on a safe cigarette will be postponed. Activities of the Survey during 1972 will shift from the collection to the analysis of data. Computer technology will hasten the forthcoming analyses of the Survey data and thereby provide researchers with information at the time of its maximum usefulness.

Cancer Therapy

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Total..................	294	$31,582,000	294	$31,881,000	--	+$299,000
In-House............	294	6,883,000	294	7,124,000	--	+241,000
Contracts............	--	24,699,000	--	24,757,000	--	+58,000

Introduction

It has been proved that drugs alone can cure some forms of cancer. This has been clearly demonstrated for choriocarcinoma and Burkitt's lymphoma. There are other cancers -- (acute lymphocytic leukemia, Ewing's sarcoma, Wilms's tumor, embryonal testicular cancer) -- that are brought under complete control for years by combinations of active drugs. A percentage of these patients have been free of evidence of disease for 10 years or more and are presumably cured. As the principles of modern cancer chemotherapy have been defined, the long term survival of patients with these diseases has been sharply increased. These principles, extended recently to Hodgkin's disease, and other lymphomas, have achieved equivalent success. The road is clearly open for application of these successes to all patients with drug sensitive tumors. These tumors constitute 15% of all clinical cancer. For the 85% of tumors that are not controlled by drugs, analysis of the successful situations has led to promising hypotheses that are under study both in the laboratory and clinic.

A key element in this success has been the development of a team of scientists and physicians with the competencies and resources to apply fundamental research results to the treatment of the cancer patients and provide necessary coordination. The emphasis is on integrated research carried out in laboratories and clinics within the Federal government, contracts with industry, and with scientists and physicians in universities. The focus of drug research and development in the Institute provides nationwide and worldwide surveillance of every new lead and the capacity to exploit it quickly to the benefit of patients.

Successful drug control has occurred among the rapidly growing tumors while the failures have been among the slowly growing tumors. Progress in the rapidly growing tumors came about because of the development and study of an excellent animal model. Such models allow the scientist to discover ways in which drugs will selectively destroy tumor cells more completely than vital normal cells, and to apply these lessons in treating patients. The recent development of slowly growing animal tumor models now permits study of the principles of control of these types of tumors.

Finally, selective toxicity of drugs can be tipped in favor of the normal cells and against the tumor cells by supportive therapy. The toxicity of drugs against normal cells is manifested by hemorrhage and infection. Hemorrhage is completely prevented by platelet replacement. Infection still occurs, but recent development of white cell replacement and laminar flow germ free environments can prevent much of the mortality from infections in patients treated in such a research setting.

Program Plans in 1971 and 1972

In order to maintain the momentum for chemical control of cancer, it is essential to undertake new ventures in order to obtain full advantage as new opportunities arise from the results of recent research.

In that part of the program relating to drug development in 1972 there will be emphasis on the more intensive study of new drugs in the clinic. The results of screening over the last 5-10 years have resulted in a fairly large number of active compounds ready for clinical trial. This will mean increased chemical production so that additional chemical prep labs will be needed. It is also planned to increase contracts for the study of drug safety in animals in order to keep up with the increased flow of drugs from the screening activities.

The biggest program deficit concerns the clinical trials. With the increased ability to find active drugs in the pre-clinical studies, there are too few institutions able to study these in patients. Expansion of existing facilities and establishment of new centers has high priority.

In the drug development area there is now a large body of information relating the structure of compounds to activity. Due to work in previous years, it is now possible to automate searching and to analyze the substructures of chemical compounds in relation to antitumor activity and toxicity. It is planned to invest more effort in automated substructure search.

There are additional plans for the expansion of supportive care of patients receiving intensive chemotherapy. The laminar flow modules have in the past year shown to be feasible and additional units will be planned at the Baltimore Cancer Research Center, the Veterans Administration and in the Clinical Center. The plans for development of full nursing units using the laminar flow principles have been held up by construction delays but individual units will be added for this expanded field trial. It is planned in 1971 to let a contract for an expanded laminar flow ward at another hospital.

In addition, the ability to type platelets, white blood cells and bone marrow cells has improved. Work in these areas will expand and donors and patients types will be placed in the automated retrieval system in 1971 and will be further developed in 1972.

Study of the kinetics of tumor cells in relation to drug susceptibility have added some new conceptual dimensions to this problem requiring additional work in 1971 and 1972. Cytosine arabinoside, a drug that specifically inhibits DNA sensitivity has been found to be an extraordinary tool for the study of the relationship of concentration of drug in biologic fluids to cell kinetics, toxicology and therapeutic effectiveness. By looking at these factors in mouse, dog, monkey and man as well as in both fast and slow growing tumors, a pattern begins to emerge showing us how to maintain the right concentration for the right length of time to kill the maximum number of tumor cells with the least possible damage to normal cells. These principles will probably have general application to a number of other antitumor drugs, and it is planned in 1971 and 1972 to expand these efforts to collect data on some of the other 40 antitumor drugs and to analyze them with this pattern in mind. Most of this has been done with the L1210 tumor in the mouse, but the new tumor models, namely AKR leukemia, B16 melanoma and the Lewis' lung tumor, will be studied during the coming years.

Treatment of the highly drug susceptible tumors in man sometimes fails because the tumors reach the central nervous system where they are protected from the effects of antitumor drugs. These studies are receiving emphasis in the neurosurgical unit at BCRC and in Burkitt's lymphoma in the Lymphoma Treatment Center in Uganda. Additional work is planned in 1971 and 1972 to design drugs that will penetrate tumors within the central nervous system and to develop an animal model in the monkey that will permit studies of better ways of treating brain involvement.

Finally, one of the major obstacles in the study of the effects of drugs on solid tumors in man is the lack of an assay which will quantify the number of tumor cells remaining after each course of drug therapy. In 1972 there will be expanded efforts especially at BCRC in the fundamental aspects of developing chemical assays for surviving tumor cells.

The Cancer Therapy program will be continued at the same dollar level as 1971.

Cancer Task Forces

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Total..................	15	$4,068,000	15	$4,079,000	--	+$11,000
Breast Cancer.........	12	301,000	12	309,000	--	+8,000
Contracts...........	--	2,458,000	--	2,458,000	--	---
Lung Cancer...........	3	120,000	3	123,000		+3,000
Contracts...........	--	1,189,000	--	1,189,000	--	---

Introduction

Breast Cancer continues to be the most common type of cancer in women in the United States. Since its beginning in 1966 the Breast Cancer Task Force has stressed the need to identify the high risk patient and to develop aids for predicting recurrence of diseases, response to treatment and survival probabilities. It has probed to bring out the possibilities of advances in cell kinetics, virology and immunology for application in breast cancer.

A Lung Cancer Task Force was established in 1968. Lung Cancer is the leading cause of cancer deaths among males and is the type increasing most rapidly. The primary areas of research encompassed by the plans for this activity include: (1) smoking and tobacco; (2) lung cancer causation other than smoking, including air pollution and host modification aspects; (3) diagnosis; and (4) treatment. Initial efforts have been focused on the first and, to a lesser extent, the third areas. The Carcinogenesis Program of the Etiology Area has undertaken responsibility for the support of the second area of emphasis in the lung cancer problem. The two programs remain closely coordinated (see Carcinogenesis section of this budget justification).

The Institute has established several other task forces or study groups. They identify major problem areas, formulate general research objectives, and, as the state of the art permits, plan and recommend specific programs and projects for implementation.

Program Plans in 1971 and 1972

Breast Cancer Task Force

There has been a significant change in the membership of the Breast Cancer Task Force with the appointment of a new Chairman and Vice Chairman and two new members. Based on the knowledge acquired by task force members and others, emphasis is now being directed to establishing a more comprehensive long range plan designed to develop a series of critical questions that face the physician taking care of women with breast cancer and to develop protocols for answering these questions. The clinical studies will be carried out in collaborating institutions and where feasible in intramural clinical units. With appropriate resources it should be possible to develop a strong NCI in-house program on Breast Cancer. The Task Force will continue to advise the Institute about studies of the biology of the breast cancer in man and experimental animals.

Studies have been conducted on a limited, exploratory scale since the initiation of the Special Virus Cancer Program to determine whether evidence could be found that viruses may be the causative agents of this disease. The search for viruses, using the electron microscope, has revealed particles resembling the known RNA cancer viruses of animals in milk of: (1) women who have had breast cancer, (2) normal women belonging to families with a high risk to breast cancer, and (3) women belonging to an inbred population (the Parsi sect of Bombay, India). Similar particles have also been seen in tissue cultures of human breast cancer cells. Other evidence--such as a unique type of nucleic acid, a unique enzyme (RNA-dependent DNA polymerase), and a unique protein (an interspecies antigen), all of which are found in association with virus-induced cancers of animals--suggests that these human particles may indeed represent virus.

Although the human particles have not yet been grown successfully in the laboratory, a similar virus has been isolated from a breast cancer of a monkey and is now being grown in the laboratory.

In 1972, studies will be conducted to investigate the candidate viruses as causes of human breast cancer.

Lung Cancer Task Force

During 1972, the Lung Cancer Task Force will continue to support a part of the efforts to implement plans developed in 1969 for a major research program on the causation, treatment, and prevention of lung cancer. The program plan is designed to seek a balance between fundamental research on the mechanisms of lung cancer causation, the development of biological models reproducing the disease as seen in man, the identification and evaluation of causative agents, as well as the development and application of existing information for the direct benefit of the patient.

Following recommendations of the Tobacco Working Group, a subcommittee of the Lung Cancer Task Force, a large program has been established to develop a less hazardous cigarette. These activities involve the preparation and chemical characterization of different types of tobacco smoke and smoke condensates, selected for their importance in determining the carcinogenicity of the condensates produced. Skin application and feeding tests are underway, while intratracheal instillation tests are about to begin. Inhalation methods, adequate for large-scale animal testing, are in the stage of pilot trials.

There is some evidence that patients with lung cancer less than 2 cm in size have a 50-60% chance of surviving for at least five years. This should be compared to 5-15% 5-year survival for all lung cancer patients. X-rays annually or even semi-annually are not sufficient to diagnose patients with lung cancer before the cancer is 2 cm in diameter. Many patients with lung cancer will have cancer cells in their sputum. However, methods of procuring sputum and the interpretation of the cells does not rest upon as sound a base as the "Pap" test for cancer of the cervix. There are patients who have cancer cells in the sputum in which the cancer cannot be found by the usual X-ray and bronchoscopic examination. The development of tantalum powder as a diagnostic aid in X-ray examination of the lung and marked improvement in bronchoscopes are being studied to improve our ability to localize lung cancers and this gives the surgeon an indication of what tissue to remove. The follow-up of early diagnosed patients and, in fact, all patients examined for cancer cells in the sputum is underway to determine how best to diagnose lung cancer and to improve the current dismal outlook for the patient with lung cancer. Much of the work described above is being conducted through a contract with Johns Hopkins University. It is planned to expand these and similar research studies by using the contract mechanism.

The 1972 budget maintains the Cancer Task Forces at the 1971 dollar level.

Cancer Research Center

During the Senate Committee Appropriation hearings last year, there was considerable discussion concerning the urgent need for greatly improved cancer treatment services in several areas of the Nation. The upper northeastern part of the United States has great need for a center which will provide patients up-to-date cancer treatment without having to travel great distances. The Committee increased the estimate for the National Cancer Institute by $3,000,000 for the development of a cancer center at the Mary Hitchcock Memorial Hospital in Hanover, New Hampshire. This action was confirmed by the Senate, the Conferee action and included in the appropriation for 1971. The National Cancer Institute is now negotiating for the award of a contract for approximately $3,000,000 in order to develop this cancer center. It is estimated that the operating cost of the center for 1972 will be $500,000. The decrease in funds of $2,500,000 in this account has been reprogrammed to meet moral commitments under regular research grants and for specialized research cancer centers to be funded through the grants mechanism.

Supporting Services

Supporting Services is primarily a service oriented unit of the Institute which provides selected administrative, office and laboratory support services. Also included in this item is the editorial review and publication of the Journal of the National Cancer Institute, a scientific publication of excellence and one of the three journals in the U.S. devoted exclusively to publication of quality cancer research results.

In 1972, the amount of funds requested will enable the Institute to continue this type of support at approximately the same dollar level as 1971.

In addition to the program changes, there is an increase of $1,101,000 which includes $231,000 for annualization of new positions in 1971, $472,000 for annualization of 1971 pay increase costs, $189,000 for within-grade pay increases, $35,000 for extra day of pay in 1972, $18,000 for FTS cost increase, and $156,000 for payment to the National Institutes of Health Management Fund for centrally furnished services.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	110	$1,581,000	110	$1,778,000	--	+$197,000
Other expenses.........	--	1,740,000	--	1,858,000	--	+118,000
Total.............	110	3,321,000	110	3,636,000	--	+315,000

Introduction

This activity supports both the scientific and administrative staff responsible for the review of all cancer grants. The staff obtains the necessary information regarding all grant applications and in cooperation with study groups makes recommendations for the consideration by the National Advisory Cancer Council which recommends approval or disapproval of grant applications. Administrative support is provided concerning policy, planning and coordination of contract activities of the Institute.

Program Plans in 1971 and 1972

In 1971 this activity will continue to provide scientific and administrative support for the review of all Institute grants. The grant program has expanded from a $93,000,000 program in 1970 to a $108,000,000 program in 1971. The policy, planning and coordination of contract activities has increased greatly due to the increase in funds for an expanded effort in viruses as cause of cancer.

In 1972, the program increase of $50,000 will provide funds for program management in connection with the expansion in the regular research grants, specialized research centers and contract programs.

In addition to the program change there is an increase of $265,000 which includes $18,000 for annualization of new positions in 1971, $132,000 for annualization of 1971 pay increase costs, $41,000 for within-grade pay increases, $6,000 for extra day of pay in 1972, and $68,000 for payment to the National Institutes of Health Management Fund for centrally furnished services.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	56	$893,000	56	$958,000	--	+$65,000
Other expenses.........	--	744,000	--	805,000	--	+61,000
Total.............	56	1,637,000	56	1,763,000	--	+126,000

This activity provides for the overall administration and direction of the programs of the Institute. The Director and his staff give professional leadership and technical guidance to the varied activities of the Institute.

In 1972, the program increase of $50,000 is requested to provide funds for the support of contracts to assist in the further development of program planning and computer applications to the research programs of the Institute.

In addition to the program change there is an increase of $76,000 which includes $13,000 for annualization of new positions in 1971, $30,000 for annualization of 1971 pay increase costs, $19,000 for within-grade pay increases, $3,000 for extra day of pay in 1972, and $11,000 for payment to the National Institutes of Health Management Fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants (Public Health Service Act, Title IV, Part A)

1971	1972	
Amount	Authorization	Budget Estimate Amount
$95,411,000	Indefinite	$97,403,000

Purpose: The National Cancer Institute, through its research grant program stimulates and supports basic and applied research activities in the broad areas of causation, diagnosis, treatment, prevention and control of cancer.

Explanation: The NCI research grant program is composed of regular program grants, general research support grants, scientific evaluation grants, specialized research centers and leukemia research support centers. Grants are awarded to public and other non-profit institutions and to outstanding individuals in support of cancer research and related activities.

Accomplishments in 1971: During 1971, a total of 1,002 regular research grants were awarded. Emphasis was placed on projects of known or potential relevance to cancer including radiation, chemical carcinogenesis, the nature of cancers and their interactions with the host organisms, immunology, drug development, and epidemiology.

Clinical investigations of new and complex anti-cancer therapies were carried out in approximately 250 institutions across the nation. The investigators at these institutions are organized in 23 cooperating groups on the basis of the therapy under study, e.g., pediatrics. urology, etc.

The NCI supported 33 Specialized Research Centers which are performing intensive, highly specialized clinical research on cancer in man.

The Institute provided support to 27 Leukemia Research Support Centers for investigators who have been obtaining, preserving, processing and administering massive platelet transfusions in the control of hemorrhage in patients with acute leukemia.

Objectives for 1972: During 1972, the funds requested will allow for the awarding of 954 regular research grants. In 1972, the program decrease of $2,651,000 includes $626,000 for general research support grants and $2,025,000 in the regular research grant program. The decrease in regular research grants will result in an overall reduction in on-going programs with the exception of the efforts in virus research. A program increase of $500,000 will serve to provide new initiatives in virology research where indications are that transformation, at least on the part of small tumor viruses, results from the attachment of one or more viral genes to cellular genes. The program increase of $1,500,000 in specialized research centers will be used to initiate one or two new centers in geographical areas where centers do not exist at this time.

Activity: Fellowships (Public Health Service Act, Title IV, Part A)

	1972	
1971 Amount	Authorization	Budget Estimate Amount
$3,798,000	Indefinite	$3,348,000

Purpose: Fellowships are awarded to promising individuals preparing for a research career in the biomedical sciences.

Explanation: Several kinds of awards designed to meet particular objectives are granted under this program. The program provides research training to individuals whose career development extends from the immediate postdoctoral period through the advanced stages of scientific attainment. The types of awards provided are postdoctoral, special, career development awards and career awards.

Accomplishments in 1971: In 1971, 148 postdoctoral and special fellowships were awarded. Also 94 career award and career development fellowships were supported.

Objectives for 1972: For 1972, the funding level requested will support 142 postdoctoral and special fellowships as well as 74 career award and career development awards. The fellowship program will continue to provide training to promising young investigators in cancer research. Emphasis in 1972 will continue to be given to the shortage areas of medicinal and organic chemistry, epidemiology, radiation therapy, surgery, hematology, and clinical pharmacology.

Activity: Training Grants (Public Health Service Act, Title IV, Part A)

	1972	
1971 Amount	Authorization	Budget Estimate Amount
$8,358,000	Indefinite	$8,358,000

Purpose: The National Cancer Institute awards to academic or research institutions which have demonstrated the ability to design and conduct successful training programs in such fields as surgery, pathology, radiobiology, radiotherapy, and internal medicine.

Explanation: Graduate research training grants provide support for trainees in the various fields related to cancer research and underwrite expenses for equipment, supplies, and training staff. Clinical cancer training grants are awarded to qualified institutions to provide training in the prevention, diagnosis, treatment, rehabilitation, and public health aspects of cancer.

Accomplishments in 1971: In 1971, approximately 587 full-time equivalent trainees were supported through 141 training grants.

Objectives for 1972: The estimate for 1972 will provide for 125 training grants consisting of approximately 526 full-time equivalent trainees. Emphasis will be placed on continuing training programs in disciplines where cancer researchers are in short supply, such as radiation therapy, clinical pharmacology, chemical carcinogenesis, epidemiology and training.

Activity: Laboratory and Clinical Research (Public Health Service Act, Title IV, Part A)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
473	$20,518,000	Indefinite	476	$21,529,000

Purpose: Research in this activity is designed to add to our knowledge the basic processes of cancer and to improve methods of diagnosis and therapy. The types of work performed are laboratory research in the fields of biochemistry, biology, pathology, and physiology and clinical research in the fields of dermatology, endocrinology, immunology, metabolism, and surgery.

Explanation: Laboratory and clinical research is conducted in the Institute's laboratory facility and in a commonly shared clinical center facility. In addition, a limited amount of the work is performed through research contracts.

Accomplishments in 1971: Research studies ranged from a study of the processes involved in translating information in the nucleus in the form of DNA to operations within the cell by enzymes. Clinical studies ranged from those designed to improve radiation therapy and surgery as therapeutic tools to those designed to determine how cancer affects the patient.

Objectives for 1972: In 1972, the program decrease of $175,000 will result in an overall reduction in on-going programs with the exception of the virus program. The program increase of three positions and $408,000 will provide for an expanded effort directed toward applying advances in immunology as related to virus to the treatment and prevention of cancer in man.

Activity: Collaborative Research and Development (Public Health Service Act, Title IV, Part A)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
771	$97,419,000	Indefinite	778	$98,301,000

Purpose: The Institute established the Etiology and Cancer Therapy areas under this activity to provide strong central leadership and responsibility for carefully planned research activities. The programs focus on causes of cancers and their occurrence patterns and prevention, as well as finding the best methods of treating cancer through the screening, testing and clinical evaluation of drugs.

Explanation: These programs include national efforts utilizing research contracts as well as investigations carried on directly in Government laboratories and clinical facilities.

Accomplishments in 1971: The principle area of emphasis in the viral oncology program was the determination of (a) cancer-causing activity in animals of viruses already isolated from human cancer, and (b) relating this activity and other characteristics of the candidate viruses to cancer in man.

In carcinogenesis, evaluation of 150 pesticides and other environmental agents has been completed in 1971. This increased screening effort, however, covers only a small portion of the thousands of chemicals now in the environment and awaiting testing as well as the thousands newly introduced into the environment every year. A Bioassay Data System for storage and retrieval of bioassay date was developed.

In addition to studies conducted in the demography area concerning occurrence and behavior of cancers in human populations, the Third National Cancer Survey continued to collect cancer information in conjunction with the 1970 census in ten metropolitan areas, two States and the Commonwealth of Puerto Rico.

The cancer therapy program has been able to carry out fundamental research on the drug control of clinical cancer, to achieve successful drug development, and to apply the results of research and development to the control of the rapidly growing tumors.

During 1971, the Breast Cancer Task Force continued comprehensive studies of women who develop breast cancer, in particular, to determine if viruses may be the causative agents of this disease. During 1971, the Lung Cancer Task Force continued to support limited initial efforts to implement plans developed in 1969 for a major research program on the causation, treatment and prevention of lung cancer.

Objectives for 1972: The major objectives in the special virus cancer program are: (a) the determination of cancer-causing activity in animals by viruses already isolated from human cancers, (b) relating this activity, and other characteristics of the candidate viruses, to cancer in man, (c) the determination of the entire sequence of molecular events, including specific enzymatic activities (e.g., polymerases) in viral replication and tumor induction, (d) relating this information to the control of cancer in man.

The chemical carcinogenesis area will give high priority to the identification of chemical-viral interaction mechanisms, the role of various chemicals and dusts in the induction of lung cancer and the establishment of data collection and retrieval systems to improve efficiency in coordinating information generated by the program and disseminating it to the scientific community.

In demography, epidemiology studies will be made in human populations of the role of viruses and chemicals in cancer initiation. In 1972, the activities of the Third National Cancer Survey will shift from the collection of data to the analysis of the data.

The major objectives of the cancer therapy area for 1972 are the development of a biochemical assay for the number of tumor cells in the body; improvement in the treatment of cancer within the brain; further evaluation of an animal model for the small growth fraction tumors; and a continued flow of new agents to the clinic.

During 1972, the Breast Cancer Task Force will direct its efforts to investigate the candidate viruses as cause of human breast cancer. Under the Lung Cancer Task Force, the objective for 1972 is the development of a less hazardous cigarette.

Activity: Review and Approval of Grants (Public Health Service Act,
Title IV, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
110	$3,321,000	Indefinite	110	$3,636,000

Purpose: This activity supports administrative staff concerning policy, planning and coordination of contract activities of the Institute. It also supports both the scientific and administrative staff responsible for the review of all grants.

Explanation: Funds are provided for the support of the in-house staff. Funds for the contract and grant programs are provided under the budget activities for research grants, fellowships, training grants, laboratory and clinical research and collaborative research and development.

Accomplishments in 1971: In 1971, this activity reviewed 2,254 grants for scientific merit and program relevance and maintained surveillance over 1,448 grants.

Objectives for 1972: This activity will continue to provide scientific and administrative support for the review of all Institute grants and will continue to establish policy, planning and coordinate contract activities. The program level for 1972 includes an increase over 1971 of $50,000 in order to provide support for the expansion in regular grants, specialized research centers and contract programs.

Activity: Program Direction (Public Health Service Act, Title IV, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
56	$1,637,000	Indefinite	56	$1,763,000

Purpose: This activity supports the Director and his immediate staff including program planning, research information and general administration. Professional leadership and technical guidance are provided to the varied activities of the Institute.

Explanation: Funding for this area provides for salaries and other operating costs for the overall administration and direction of the programs of the Institute.

Accomplishments in 1971: The planning staff of the Office of the Director has continually provided analysis, consultation and guidance to varied activities both within and outside the NCI for effective planning and operation of their programs. The production of the television program on "Progress Against Cancer" is now in process.

Objectives for 1972: Increased program planning and the development of computer applications to the programs of the Institute will be undertaken with the increase of $50,000. It is planned that the television program "Progress Against Cancer" will be televised during 1972.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Laboratory and clinical research			
Medical Officer	GS-15	1	$22,885
Biologist	GS-13	1	16,760
Biologist	GS-9	1	9,881
		3	49,526
Collaborative research and development			
Medical Officer	GS-15	1	22,885
Medical Officer	GS-14	1	19,643
Microbiologist	GS-14	1	19,643
Biologist	GS-13	1	16,760
Biologist	GS-9	1	9,881
Chemist	GS-7	1	8,098
Secretary	GS-5	1	6,548
		7	103,458
Total new positions, all activities		10	152,984

NATIONAL CANCER INSTITUTE

STATEMENT OF DR. CARL BAKER, DIRECTOR

ACCOMPANIED BY EARLE BROWNING, FINANCIAL MANAGER

EXPANDED CANCER ACTIVITIES

Senator COTTON. The National Cancer Institute, Dr. Baker.

Do you have a statement?

Dr. BAKER. I will talk for a few minutes to introduce the remarks and then stand ready for questions.

Senator COTTON. Go right ahead.

Dr. BAKER. The movement, of course, in the cancer field is going along quite well with a great deal of excitement these days, both in terms of the political arena as well as the scientific arena. One of our main tasks in the Cancer Institute currently is to make sure that we keep the ship on even keel and get ready for expanded cancer activities and not get too excited about unforeseen problems that may or may not come down on us later.

I think the staff is doing——

Senator COTTON. What you mean is, get it out of the hands of the politicians and back to the doctors?

Dr. BAKER. I think there is plenty of difference of opinion among the doctors as well. What I am trying to say is that the staff of the Institute at least is trying to focus primarily on cancer activities and prepare the groundwork for some expanded efforts which seem to be coming, but what the exact form will be is not yet clear.

In the treatment area, we continue to have a number of successes, with several new drugs developed each year. The number of drugs has risen from three compounds per year to four last year to six this year. The number of compounds now in use in clinical cancer work total over two dozen compounds. We have long-term remissions in certain forms of cancer now. These kinds of cancer represent totally only 15 percent of all cancers. We think we have developed, however, the means for expanding work into the more common forms of cancer and look forward with the new resources to be able to expand both the numbers of drugs ready for clinical trial, expand the ways in which we know how to use those compounds, and expand into new screens which will allow us to make selections of new agents in the common tumors. In the past most of our selections have been done on these more unusual tumors which we call rapidly growing.

So one of the areas for expansion which we think is easily ready for enlargement is in the whole area of searching for new drugs in cancer chemotherapy.

There has been progress made in radiotherapy. In Hodgkin's disease (a form of cancer of the lymphoid tissues), with the exception of late forms, we are now seeing 90 percent remissions with radiation treatment of these patients. The remissions are remaining a long time with radiotherapy.

We have some drugs which will also produce long-term remissions in Hodgkin's disease. We have yet to extensively look at the combination of radiotherapy and drug therapy.

The area of viruses and cancer continues to move rapidly. Undoubtedly, you have seen some of the excitement in the newspapers the last week or two about a finding from Texas on a form of virus that is associated with leukemia, lymphomas and sarcomas. Some of the headlines stated that this was the first time that we had grown a human cancer virus. This may be true, but we do not think this is established at this point in time, and it will take a lot more work before we are able to show that in fact this particular virus is producing a human cancer.

SPECIAL VIRUS CANCER PROGRAM

On the other hand, the finding is very important. This is the kind of virus that we were very interested in from the beginning of the special virus cancer program, because it is found in association with leukemias, lymphomas and sarconas and is the type of virus we know produces leukemias in several animal species. And, as we have mentioned before, some of these animal leukemias can be protected against by vaccination. So we need this particular virus in quantity in order to do some additional studies in man.

We have been trying for 4 years to get this material to grow in quantity at high concentrations and have not succeeded. One of the really important developments from Houston in the M. D. Anderson Hospital is the fact that we will now have quantities of this virus which will permit us to do studies in man to look for associations in various forms of human cancer, and pinpoint whether this virus is indeed associated with human cancers. And ultimately we will hope to develop control measures to pin down whether in fact this is causative and whether we have an effective means for prevention.

The developments in radiation therapy for the future have some additional exciting possibilities. Recently developed and developing in the future are new forms of radiation called pi mesons. The characteristics of these radiation particles are such that we should expect better treatment with radiation with this form of radiation. The Atomic Energy Commission at Los Alamos is building a new instrument to produce these particles. We are joining forces with that group and the University of New Mexico to develop a medical unit at the end of this instrument which will allow us to produce these pi mesons for biological and medical studies without interfering with the work that the physicists will be doing.

One of the clever developments in this instrument is the opportunity to be able to continuously have part of the beams coming off the machine going in one direction for the physicist to use and another part going in the other direction for the biomedical people to use. So we hope to find in short order whether the expected improvement in these forms of radiation will, in fact, produce better results in patients.

In the past, we have mentioned to this committee advances in earlier diagnoses in breast cancer with mammography in the form of soft tissue X-rays. We reported last year that we were able to pick up some additional breast cancer cases utilizing this technique compared with the standard methods of examination. What we also need to know is whether this earlier diagnosis will, in fact, allow us to reduce the mortality.

In collaboration with the Health Insurance Plan Group in New York City we instituted 5 years ago such a study. We have the first results from that study that are definitive, and I am pleased to report that in that study a 40-percent improvement in mortality is occurring in those breast cancer patients that had the benefits of the mammography diagnostic procedure.

So I think we are now able to say that we have established that this form of earlier diagnosis is, in fact, not only picking up more cancers, but is actually producing a reduction in mortality in this form of cancer, which, of course, is the leading cause of death from cancer in women.

As a matter of fact, until recently, the mortality of this form of cancer had been steady for 30 years, even though improvement in treatment was present. The reason the mortality was the same was that the incidence of breast cancer was going up. So this new technique is an encouraging sign.

Now the basic research areas are moving well, such as in cell control mechanisms. One of the areas of excitement of scientists is the richer understanding of what controls the way cells work, and one of the great excitements that has come from the cancer virus area is that the viruses provide additional tools to the basic scientists for finding out how the control of cells is altered, what happens, for example, when a cell is transformed from a normal tissue to cancer cells.

Dr. Marston mentioned some of the developments in this area in his statement. There are many areas of excitement and new tools which will allow the scientist to understand better what is going on in the cell-control mechanism.

RESEARCH LEADS IN IMMUNOLOGY

In the area of immunology, new exciting leads are present. For example, we are about ready to be able to map what the cell surface looks like by using antibodies and antigens and studying where they react on the cell surface. And we have indications that cells change their surface properties when they go into mitosis, that is, when they are getting ready to divide, and the cancer cells seem to have characteristics like those cells that are going into cell-division.

The important future developments here reside in the possibility that we may be able to definitively design agents which will stick on particular places on the cell surface, and we will be able to destroy certain kinds of cells by this device. So ultimately we would hope to design therapeutic measures which will very specifically hit particular kinds of cancer cells. I should warn we are not ready for that yet, but the potentialities of these new leads in immunology are quite exciting.

The Institute has been very busy getting ready to improve planning for expanded efforts. You will recall that the panel of consultants for the Senate who recommended the enlarged cancer program and administration's testimony in the past both called for an enlarged planning effort: the development of a national plan. We have been scheduling out how this planning should be done.

It is our intent to bring large numbers of scientists throughout the country into this process to make sure that we have their inputs, and try to capture their commitment to the new cancer program. We would expect to have large numbers of expert scientists together in the fall to help us lay out the new national plan.

As you recall, we testified earlier for the hundred million dollar supplemental appropriation so we need to think that what we are here for today is actually a rate for this fiscal year of $234,338,000.

Senator Cotton. That means the hundred million dollars plus three and a half million dollars?

Dr. Baker. Yes, sir. Well, actually $3,876,000 plus the additional $100 million.

Senator Cotton. Over last year.

Dr. Baker. Over last year.

Senator Cotton. You have three and a half million dollars in your regular over last year.

Dr. Marston. You will recall we had special hearings on the $100 million supplemental appropriation during which we reviewed the progress of the Cancer Institute and presented justifications covering the total level of $334 million for 1972.

Dr. Baker. That approximate $3½ million dollars is represented by an increase of $1,922,000 for research grants, an increase of $2,334,000 for direct operations, and a decrease of $450,000 in fellowship grants. Much of the testimony on what we would do with the new look was given in the testimony for the hundred million dollars. But I will be pleased to answer any questions I can.

Senator Cotton. By direct operations, you mean——

Dr. Baker. Work conducted either in-house at Bethesda or the contract operations with the contracts being spent throughout the country. So we divide into the grants activities areas on the one hand and direct operations on the other.

Senator Cotton. You have the same problem that all the rest of the Government has with certain automatic pay raises?

Dr. Baker. Yes, sir.

Senator Cotton. Is that included in the $3.5 million?

Dr. Baker. No, sir; we don't have the total pay raise in that particular figure. However, the $3.5 million does include certain built-in increases pertaining to personnel which total $1,715,000. These include annualization of positions new in 1971, annualization of the 1971 pay raise, automatic within-grade increases, and one extra day of pay.

BUDGETED POSITIONS

Senator Cotton. How many new positions?

Dr. Baker. We have asked for 250 new positions with the $100 million. The position level for last year was 1,410. We are requesting an additional 10 positions in the 1972 budget for virus research. In summary, the total budget for 1972 includes 1,670 positions.

Senator Cotton. That is to pick up the slack on the whole so-called present program and your own?

Dr. Baker. Yes, sir. I would mention that we felt that we have been a little tight on positions. Since 1968 our program in the Cancer Institute expanded by $58 million and our position ceiling dropped by 83 positions. So, we felt it very imperative to ask for additional positions.

Senator COTTON. Now, these are questions prepared for the chairman. I asked the question about the research centers. I believe he called on you and you answered where some of these research centers are located. Had you completed that answer?

Dr. BAKER. Yes, sir. I might add that we don't know exactly where the centers will go, since we have competitive reviews to be accomplished. But I did cover generally where we thought we would like to have them.

NEW CENTER LOCATIONS

Senator COTTON. Will you insert at this point in the record so far as you know now what the locations are of the new centers? These are all for research, they are not for treatment; is that right?

Dr. BAKER. Yes, sir. We can only cover with our authority research and research training. As I indicated earlier, the organizations usually have other sources of money that cover straight care activities. We try to work cooperatively with them.

Senator COTTON. The hundred million dollars asked for by the President is all for research?

Dr. BAKER. Yes, sir.

Senator COTTON. That was his declared purpose, as I remember it.

Dr. MARSTON. Yes, sir.

Senator COTTON. I do not expect you to know where they are all going to be, but supply us what you have in mind.

Dr. BAKER. Yes, sir.

(The information follows:)

NATIONAL CANCER INSTITUTE

CANCER RESEARCH CENTERS

New cancer research centers are in various phases of development in the following geographical areas:

Southeast: Planning grants have been awarded to the University of Alabama, University of Miami and Bowman-Gray Medical College, North Carolina. It is expected that operational applications will be received from these medical schools for centers in 1972.

Southwest: A planning grant has been awarded to the University of New Mexico for the development of a center in Albuquerque. Much of this development is centered around the AEC energy facility at Los Alamos.

Mountain States: Discussions are underway for the development of a center in Denver, Colorado.

Far West: Discussions have been held with the University of Southern California. The planning is at a stage now when an application for operational funds is expected in 1972. Discussions are underway with the University of California at San Diego and the University of California at Los Angeles. These centers are possibly in conjunction with the Salk Institute.

Pacific Northwest: The Regional Medical Program has been considering the award of $5,000,000 for the continuation of a cancer center in Seattle. The National Cancer Institute anticipates providing operational funds with approval of the National Advisory Cancer Council as a follow-up to the planning grant we have had with them following construction. Discussions are being held with the staff of the University of Oregon.

EXPANDED PROGRAM MANPOWER

Senator COTTON. From where will you get the manpower to effectively utilize all these cancer supplemental funds, the hundred million dollars plus the additional that you have asked for?

Dr. **Baker.** We have made some projections on manpower at different levels of programing and don't believe we have any problems on manpower until we get to amounts considerably larger than the amounts we are talking about. A number of investigators who have been coming off the training pipeline have been having some difficulty getting positions that are senior enough to accommodate their training.

For example, in drug therapy we have a number of young men who have been adequately trained to run larger therapy programs who do not have the opportunities to do so now. We would visualize that some expansion in our contract side with industrial concerns will account for some of the manpower.

Basically we feel there is no problem at this point in time.

Senator **Cotton.** You aren't—I started to use the word "pirating," but it does not mean that you are getting researchers to leave other important medical fields?

VIROLOGISTS IN CANCER FIELD

Dr. **Baker.** We are certainly concerned about that. There have been a number of virologists, for example, who have come into the cancer field. I think there is some concern on the part of Dr. Davis whether we might be reaching a stage where too many virologists are leaving areas in his institute—National Institute of Allergy and Infectious Diseases—which would be a problem. Certainly, there has been an excitement in molecular biology by many investigators who were not interested in cancer before, who have gotten interested lately.

I have had visits by several of them. In view of some of the problems of funding in the general medical sciences area, again at this level of funding I don't believe that is a serious problem.

Dr. Marston, maybe you would like to comment on that.

Dr. **Marston.** I think, Senator Cotton, this involves a question you raised earlier. If, in fact, the funds are diverted from other areas of research to cancer research, the people are going to follow. In such case, I think the likelihood is that their talents will be less well used than they would be in their areas of first choice.

If, over time, dollars become tight and reductions must be made in other research areas in order to keep the cancer program moving, then clearly investigators will almost be forced into moving into that area of research. I think under both circumstances this would be just the opposite of what the President and others have wanted to have happen. The President stated to the College of Cardiologists very clearly earlier this year that it was not his intention to have the cancer development at the expense of other health programs.

Senator **Cotton.** It has been my observation over the last few years, both in the field of education, and health and, to a certain extent, some activities of welfare, there has been a tendency by the Bureau of the Budget, when they try to hold down or cut the budget, to do it at the expense of the training of future scientists.

It has been the constant complaint, and I think a very justifiable one, of scientific people, both medical and others, that such a policy is terribly false economy. Because, as I phrase it, it is a good deal like painting your house and repairing the roof and then letting the fire insurance lapse. When the cut is made there, you do not see the immediate effect, but it means in a few years you will because there will be a scarcity of new scientific people to come along to fill the places of those who in the course of time retire or go on.

This committee has been admonished again and again and again by all of you people and by all of the medical and scientific people to avoid that kind of economy. Yet we have been guilty of that. Now you come to a sudden new spurt in this field of cancer. I don't see how it can help, I don't see how you can staff an institution with people without encroaching on somebody.

PROBLEM OF TRAINING

Dr. BAKER. In our projects it is quite clear that if the level of cancer program goes on to higher levels, then we need to think about training certainly next year, if not this year. In the planning we have laid out, we expect to develop the needs for training in considerable detail. I think you are right, if this program goes to higher levels, it will be essential to add more training very soon to be ready for that.

Senator COTTON. Presumably you people or somebody sold the President on this very meritorious idea. How did you arrive at the figure of a $100 million for the cancer supplemental request? Can you give us an accurate breakdown of how you intend to spend this money?

Dr. BAKER. I can certainly give you an answer to the latter part of the question, of how we intend to spend it. How the exact level of a $100 million was arrived at, I cannot answer. In part of the developments for health options——

Senator COTTON. You mean you can't answer it without betraying a confidence?

Dr. BAKER. Honestly, I don't know how the figures were arrived at. In the health options that were developed last year, cancer was one of the health options proposed. I don't think the exact dollar amount was actually put on the proposals that were under discussion. There is general arrangement, as I understand it, that the President himself was convinced that the cancer initiative was one of the good health options. I think the figure is an appropriate level of investment based on the projections that were made. To my knowledge, I don't know that it was done any more explicitly than that particular level. We testified previously on the spread of the $100 million. Of course this could change with perhaps a new conquest agency ahead. We propose spreading the $100 million as follows:

In chemotherapy, $19 million; in the etiology area——

Senator COTTON. What does that mean?

Dr. BAKER. This is the area that is concerned with causation, the study of causation of cancer, etiology. This includes the virus causation of cancer, the chemical causation of cancer. We also have our biometry and epidemiology activity in that same section.

FUNDING ALLOCATION

For etiology, we propose $20 million. In task forces for breast cancer, lung cancer, colon cancer, bladder, prostate cancer, we propose an addition of $10.3 million. In the intramural general labs and clinic activities $1.8 million. In regular project grants, $10.4 million. In special program grants, which includes the centers, $18 million. In training, $2 million. In construction, renovation and construction planning, $16 million. In review and approval, program planning, direction and development of new information systems, $1.5 million.

We can submit this table for the record.

Senator Cotton. I think it would be well to receive that for the record.

(The table follows:)

DISTRIBUTION OF THE $100,000,000 SUPPLEMENTAL

	1972 (excluding $100,000,000 supplemental)	$100,000,000 supplemental	1972 (including $100,000,000 supplemental)
Grants:			
Regular program	$69,123	$10,389	$79,512
Cancer research centers	20,953	26,000	46,953
Leukemia research support centers	1,851		1,851
Scientific evaluation	201		201
General research support grants	5,275		5,275
Total research grants	97,403	36,389	133,792
Fellowships	3,348	200	3,548
Training	8,358	1,800	10,158
Total grants	109,109	38,389	147,498
Direct operations:			
Labs and clinics	21,529	1,800	23,329
Collaborative research and development:			
Cancer therapy	31,881	19,000	50,881
Etiology	57,581	20,000	77,581
Task forces	4,079	10,311	14,390
Supporting services	4,260	1,000	5,260
Cancer research centers	500	8,000	8,500
Total collaborative	98,301	58,311	156,612
Review and approval	3,636	200	3,836
Program direction	1,763	1,300	3,063
Total direct operations	125,229	61,611	186,840
Total NCI	234,338	100,000	334,338

Note: The $100,000,000 supplemental includes $16,000,000 within cancer research centers ($8,000,000 in grants and $8,000,000 in direct operations) for planning, renovation, and construction.

INTERPRETATION OF RESPONSIBILITIES OF NIH DIRECTOR RESPECTING PROPOSED CANCER AGENCY: S. 1828

Senator Cotton. Now I come to the question that I asked this morning on my own. How do you interpret administrative responsibilities of the Director of the National Institutes of Health in relation to the conquest of cancer agency proposed in S. 1828 by the Committee on Labor and Public Welfare should the bill become a law?

Would the Director of the National Institutes of Health review the new agency's budget?

Dr. Baker. As the bill has stated, in its present form the Director of the NIH would have an opportunity to comment on the budget, but not change it. The wording in the bill of the independent agency within NIH has given us all, I think, a great deal of concern on the interpretation. We have had a number of preliminary sessions trying to spell out what the ingredients of working together cooperatively are to be, a cooperation certainly emphasized in both the bill and the committee report.

Dr. Marston said he was an optimist. So am I. I am optimistic enough to think that these issues will be worked out equitably, productively. Certainly, NIH scientists working together in collaborations between the Cancer Institute and other institutes has worked well in the past, and I would not see that that would be changed. I think there are some touchy questions on priority decisions that the Director of NIH has to make which is changed now by having the cancer part of it, not in that same framework.

We have, I think, some work to be done to define more fully what "independent agency within NIH" means. I think it is likely to be worked out.

Dr. Marston. I think I commented on that this morning.

Senator Cotton. Are you budgeting increases in fellowships and training grants to accompany your expanded research efforts?

Dr. Baker. A moderate amount; yes, sir. We anticipate a $3.5 million level in fellowships and $10 million in training grants. This is a moderate increase over previous years.

Senator Cotton. By moderate increase you mean——

Dr. Marston. We will have an increase in the $100 million, additional funds of $2 million for training. I should point out that this was the one case where the OMB allowed us to deviate from the plan to have level training programs pending the completion of our training study. As you described so well a short time ago, you can't have a major program increase unless you have an increase in training. For that reason we have an increase in training programs in the cancer program this year.

Senator Cotton. Is it included in this budget we are talking about today?

Dr. Marston. Yes, sir. It is in the $100 million supplemental appropriation the Congress approved in May of this year.

Senator Cotton. It is part of the President's recommendation?

Dr. Marston. Yes, sir.

Regional Medical Programs

Senator Cotton. Now we understand that cancer research is also carried on in the regional medical programs, in the Health Services, and the Mental Health Administration Centers. Could you furnish for the record all the parts of the government that do cancer research? How are these efforts coordinated to avoid duplication.

Dr. Baker. Yes, sir. We have a bit of information we can put in the record on that which we keep up with. We ought to also include what is done in the VA and the AEC, because that is all part of that same question.

Senator Cotton. There are several appropriations in this bill that we are working on now for cancer research that are not included in what we are talking about now?

Dr. Baker. Yes, sir. We will develop a statement on that. I think the kind of research done in those other groups are quite different in flavor. Much of what is still done in the regional medical programs in reference to cancer is down at the end of the spectrum of application into the practice of medicine and in community medicine, while most of our research is carried up to that point.

So the first point I make is that the overlap is not great for that general reason. There are some activities in cancer that seem to have gotten lost in the shifts recently in the regional medical programs. For example, the extent of applying Papanicolaou smears for cervical cancer seems to be less these days than in the past. We are in the process of reexamining some of those issues to make sure that the gaps are not there. We keep up quite well with the kinds of work that are going on in the other agencies. We have some very good joint ventures with the Veterans' Administration, particularly at the Washington Hospital Center for chemotherapy. We transfer money to them for that. We will develop that in a fuller statement.

(The information follows:)

Other Government Agencies that Perform Cancer Research

Cancer research activities are performed in the Atomic Energy Commission, Veterans Administration and Health Services and Mental Health Administration. In many cases these are cooperative type arrangements where NCI and the other agency jointly conduct cancer research. In other cases, the reasons for cancer research differ, based on the mission of the organization. For example, the Atomic Energy Commission is concerned with the biological problems of the late effects of radiation received at very low dose rates by large populations. There is extremely close coordination of cancer research among the various agencies through joint meetings, and combined funding of collaborative projects. The types of work conducted in other government agencies related to cancer are as follows:

U.S. ATOMIC ENERGY COMMISSION

The Cancer Research Program of the AEC–Division of Biology and Medicine seeks to discover, develop and perfect unique means of diagnosis and therapy of cancer and to acquire additional knowledge for these purposes from studies on the metabolic patterns of malignant diseases and the affected host. Its sphere of activity in oncological research is a circumscribed one embodying studies into the causes and prevention of cancer as an occupational hazard in atomic energy operations, and the development of new approaches to the study and treatment of cancer.

Originally the AEC's biomedical research program concerned itself primarily with observing, describing and explaining the acute effects of relatively high doses of various types of ionizing radiation. With the shift of emphasis to peacetime developments such as power reactors, the biological problems of high priority simultaneously shifted to concern for the late effects of radiation received at very low dose rates by large populations of human beings. Of chief concern were late somatic effects such as shortened life-span and carcinogenesis and those effects on the hereditary material (mutations) which might be transmitted to future generations.

HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION

Cancer control program

Prior to 1958 the National Advisory Cancer Council, though its Field Investigation and Demonstration Branch, considered contracts and grants which had to do with the clinical aspects of cancer control. The mission of the program was to foster the reduction of disability and death from cancer, making use of the best available practices in prevention, detection, diagnosis and treatment and case management woven into the fabric of medical services throughout the nation.

In 1959 the transfer of these services to the Bureau of State Services, Cancer Control Section, was completed and finally cut adrift from the activities of the National Cancer Institute (NCI).

The Cancer Control Program has recently become more closely related to its present parent organization, the Regional Medical Programs Service, a division of the Health Services and Mental Health Administration. Its activities have been progressively diminished both by the policy decision of the present administrative agency concerned and by a great reduction in recent congressional appropriations. It was terminated by the last legislation pertaining to it. Because of this action, the National Cancer Institute is considering the possibility of picking up some pieces of the Cancer Control Program. This would have to be on a very selective basis since funds were not requested in this budget for this purpose.

Regional medical program

This program was implemented after 18 months of deliberation by the President's Commission on Heart Disease, Cancer and Stroke. Some of the recommendations of that Commission were translated into legislation in 1965 under Public Law 89–239. The purpose of the program was to deliver better quality health care, specifically in diagnosis and treatment of heart disease, cancer, stroke and related diseases, at the community level. The main force of the program has been in education and in assisting state organization of various groups working in the fields of heart disease, cancer and stroke.

The Division of Regional Medical Programs (RMP) was organized as a part of the National Institutes of Health and then transferred to the Health Services and Mental Health Administration in 1966 as the Regional Medical Programs Service. Fifty-five regions have been organized and each is planned to meet the unique needs of its own area.

Staff of the Cancer Institute and a representative of the National Advisory Cancer Council, Dr. Sidney Farber, who attends the Regional Medical Program Council meetings, make sure that scientific knowledge is exchanged between the two programs. In addition, a representative of RMP always attends the meetings of the NACC. In some areas NCI has geared up in the cancer research centers within the pattern of the regional medical programs. In a few places, not many, it is possible then to make a blending of the cancer research efforts with the cancer care but, for the most part, these two efforts have gone somewhat separately because of the regional medical program emphasizing the straight care and much of NCI activity emphasizing research.

NCI has also worked with RMP in helping develop the cancer registries that many of the regional medical programs have developed.

VETERANS ADMINISTRATION

The Veterans Administration has for many years had a large and active cancer control and treatment program underway. Clinical and large-scale cooperative studies seek to determine the best treatment from the three available modalities—drugs, surgery, and X-ray therapy. Basic studies deal with hormonal influences on malignancy, mechanisms of causation, and various aspects of metabolism and control.

A new National Cancer Institute-Veterans Administration Hospital, oncology service was officially dedicated in 1970 at the VA hospital, Washington, D.C. A 30-bed facility at the hospital is assigned to this service, which plans and conducts clinical trials with new and established anticancer drugs and investigates the activity of promising new agents. This collaboration is viewed by both agencies as an excellent example of cooperative efforts for the enhancement of both programs and the furthering of mutual aims including the best of patient care.

Other types of cooperative work being conducted with the Veterans Administration are Lung Cancer chemotherapy. Pacific VA Cancer Chemotherapy, Surgical Adjuvant Cancer Chemotherapy and Urological Research. A representative of the VA is a member of the National Advisory Cancer Council.

ARMED FORCES INSTITUTE OF PATHOLOGY

The Armed Forces Institute of Pathology has conducted many training programs in pathology which have contributed significantly to the present available manpower. The publication of the two series of the "Atlas of Tumor Pathology" has added immeasurably to the knowledge of the natural history of cancer in individual anatomical sites of the human body. In the way of coordination, a representative of the Armed Force Institute of Pathology is a member of the National Advisory Cancer Council.

DANGER SIGNS OF CANCER

Senator COTTON. A lot of that is in detecting cancer in the field?

Dr. BAKER. Yes, sir. We have not been doing much of that in the cancer field.

Senator COTTON. I spend a lot of time at home and have become quite a monitor of television, which has not improved my mind a great deal. But I frequently see these health plugs in which they warn people to have frequent examinations. They always say, "Learn the seven danger signs of cancer." They never tell what they are. Probably if they did, everyone would think they had them. Is that the reason they never disclose them?

Dr. BAKER. Some ads do have them. I think that in the other ads, they don't have time enough for people to read them and they are trying to pique the interest of the audience and get them to go and find out what they are. I think that is the philosophy of those very short ads. The American Cancer Society has done a good job in distributing them widely.

Senator COTTON. I thought it might be malice aforethought, because frequently when I have gone to a hospital for checkup or treatment they put you in a cubbyhole and then you wait there 45 minutes for a doctor to appear. There is nothing to read except the book there. What is it you doctors call it, a description of symptoms of diseases? What is the technical name of that?

Dr. BAKER. Is it on diagnoses?

Senator COTTON. No, it is a great big fat book. You go all through it, it names all the diseases and symptoms.

Dr. BAKER. There are several of them.

Senator COTTON. I sit there reading that until the doctor comes, and I find I have the symptoms of every one of those.

Senator MAGNUSON. All they ever gave me was a 5-year-old National Geographic magazine.

Senator COTTON. That is out in the waiting room. The nurse escorts you into this cell where you wait to be examined. I understand you envision the use of aerospace personnel in the expanded cancer research program. Will you tell us what you have in mind there?

Dr. BAKER. This was a point that was brought up previously. I think it would be misleading to think that any sizable numbers are likely to be utilized in the expanded cancer effort. What we had in mind was the bringing to bear in some programs like the viruses work and the chemical carcinogenesis work some more systems management activities which aerospace engineers have developed, and apply it in those areas of cancer research where we think it can be applied.

We don't think this is possible in all parts of the program, and I think it is fair to say that we will not be able to use very large numbers of these people. I have had some discussions with other Cancer Institute directors suggesting that perhaps some of these individuals could help run their programs better in their own institutions. Two or three have taken the suggestion that they probably would think about bringing them on, but I don't think we should mislead anyone to think that this is going to account for very large numbers.

Senator COTTON. I have one other question to ask on behalf of the Senators from Maryland. Do you have any plans to use the former Army biological warfare facility at Fort Detrick, Md., or other closed or closing military facilities?

Dr. BAKER. We have plans in the Cancer Institute if the decision is made, which has not been made as yet, to develop a program level of about $6 million worth of effort at Fort Detrick. We have developed plans mostly in our cancer virology effort for a $6 million program effort at Fort Detrick should that decision be made. We are still waiting on the decision.

Senator MAGNUSON. I have one question. It might apply to some work you might do through the regional medical program. There is a shortage of cobalt machines, isn't there?

Dr. BAKER. No, sir. There is a shortage of radiotherapists who use them.

Senator MAGNUSON. Therefore, sometimes people have to travel long distances to get to one; is that correct?

Dr. BAKER. The biggest problem is that we don't have enough radiotherapists.

Senator MAGNUSON. Who know how to use them?

NEED FOR RADIOTHERAPISTS

Dr. BAKER. Yes, sir. The Cancer Institute took some steps 10 years ago to try to increase the supply of radiotherapists because the number retiring and dying off were not being replaced by the ones coming into the field. We have made some progress in reversing that trend, but recently the radiologists have produced a split in their professional societies between those radiologists concerned with diagnoses and those radiologists concerned with treatment.

This is going to really, in net effect, give us a further shortage of radiotherapists. We will have to take some additional efforts to train more radiotherapists. So in terms of cobalt machines, we are almost worried the other way. There are many of them in localities where some people are using them who are not properly trained to use them. It is not the shortage of the cobalt machines, but rather the well trained radiotherapists.

I suspect a better approach to this will be to travel people to the centers where the excellent radiotherapy can be given.

Senator MAGNUSON. Where you are sure the experience is available?

Dr. BAKER. Like the Swedish Hospital. It is to get that kind of high expertise training, to bring the patients there rather than to try to get that kind of expertise spread around.

Senator MAGNUSON. I have no further questions on this item. Thank you, Dr. Baker.

NATIONAL INSTITUTES OF HEALTH

NATIONAL HEART AND LUNG INSTITUTE

Justifications

Appropriation Estimate

NATIONAL HEART AND LUNG INSTITUTE

For expenses, not otherwise provided for, necessary to carry out title IV, part B, of the Public Health Service Act, [$193,479,000] *$195,492,000.*

Amounts Available for Obligation

	1971	1972
Appropriation...........................	$193,479,000	$195,492,000
Real transfer to:		
"Departmental management"............	-24,000	---
Real transfer from:		
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs)..	1,446,000	---
Comparative transfers to:		
"National Institute of General Medical Sciences"..................	-144,000	---
"National Institute of Child Health and Human Development"............	-36,000	---
"Health Manpower".....................	-4,332,000	---
"Office of the Director".............	-71,000	---
Comparative transfers from:		
"National Institute of Arthritis and Metabolic Diseases"................	78,000	---
"National Institute of Allergy and Infectious Diseases"...............	802,000	---
"National Institute of General Medical Sciences"..................	429,000	---
Total, obligations..............	191,627,000	195,492,000

Obligations by Activity

Page		1971 Estimate		1972 Estimate		Increase or Decrease	
Ref.		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
79	Research..............		$118,083,000		$120,981,000		+$2,898,000
	General research support grants.....		(8,127,000)		(7,267,000)		(-860,000)
	Scientific evaluation and planning.......		(163,000)		(163,000)		---
	Heart cooperative drug study.........		(4,579,000)		(3,255,000)		(-1,324,000)
	Specialized research centers............		(16,442,000)		(16,442,000)		---
86	Fellowships..........		6,871,000		6,195,000		-676,000
87	Training.............		13,592,000		13,592,000		---
	Direct operations:						
88	Laboratory and clinical research...	358	16,361,000	369	17,137,000	+11	+776,000
89	Collaborative research and development.....	40	30,612,000	46	31,166,000	+6	+554,000
92	Biometry, epidemiology and field studies...	64	1,990,000	64	2,048,000	---	+58,000
92	Review and approval of grants.............	72	2,669,000	72	2,886,000	---	+217,000
93	Program direction.....	56	1,449,000	56	1,487,000	---	+38,000
	Total obligations.....	590	191,627,000	607	195,492,000	+17	+3,865,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions..	590	607	+17
Full-time equivalent of all other positions.........................	63	63	--
Average number of all employees......	645	658	+13
Personnel compensation:			
Permanent positions...............	$8,341,000	$8,937,000	+$596,000
Positions other than permanent.....	423,000	515,000	+92,000
Other personnel compensation.......	68,000	68,000	---
Subtotal, personnel compensation.	8,832,000	9,520,000	+688,000
Personnel benefits..................	871,000	912,000	+41,000
Travel and transportation of persons...........................	375,000	383,000	+8,000
Transportation of things............	75,000	84,000	+9,000
Rent, communications, and utilities..	325,000	325,000	---
Printing and reproduction...........	200,000	200,000	---
Other services:			
Project contracts.................	29,728,000	30,122,000	+394,000
NIH Management Fund...............	7,965,000	8,403,000	+438,000
Other.............................	1,510,000	1,525,000	+15,000
Supplies and materials..............	2,200,000	2,230,000	+30,000
Equipment...........................	1,000,000	1,020,000	+20,000
Grants, subsidies, and contributions.	138,546,000	140,768,000	+2,222,000
Total obligations by object.......	191,627,000	195,492,000	+3,865,000

Summary of Changes

1971 estimated obligations..........................	$191,627,000
1972 estimated obligations..........................	195,492,000
Net change..........................	+3,865,000

	Base		Change from Base	
	Positions	Amount	Positions	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs..........	---	---	---	$407,000
2. One additional day of pay in 1972............	---	---	---	27,000
3. Within grade pay increase.				153,000
4. Noncompeting continuation of research grants......	---	---	---	2,499,000
B. Program:				
1. Research grants...........	---	$118,083,000	---	399,000
2. Laboratory and clinical research................	358	9,946,000	11	118,000
3. Collaborative research and development.........	40	30,483,000	6	500,000
C. Payment to "National Institutes of Health management fund" for centrally-furnished services....................	---	7,965,000	---	438,000
Total, increases.......	---	---	17	4,541,000
Decreases:				
A. Program:				
1. Fellowships..............	---	6,871,000	---	-676,000
Total, net change.................	---	---	+17	+3,865,000

Explanation of Changes

Built-in increases--The increases will provide: $407,000 for annualization of 1971 pay increase costs; $27,000 for one additional day of pay in 1972; $153,000 for within grade pay increases in 1972; $2,499,000 for changes in the amounts required to fund in 1972 those project grants which were funded in 1971 and are being continued in 1972 as a part of a commitment made prior to 1972.

Research grants--The net increase of $399,000 includes: increases of $701,000 for new initiatives of high priority in research on arteriosclerotic and pulmonary diseases and $3,500,000 for basic and clinical research on Sickle Cell Anemia; as well as decreases of $1,618,000 for programs of lesser priority, $1,324,000 for the Heart Cooperative Drug Study, and $860,000 for general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships--The request includes a decrease of $676,000 and an estimated decrease of 84 fellowship awards.

Laboratory and clinical research--The program increase of $118,000 and 11 positions will permit full implementation of the new Pulmonary Function Laboratory and for increased activity in the study of lipidosis and in coronary artery disease in conjunction with the Collaborative Research and Development program.

Collaborative research and development--The net program increase of $500,000 and 6 positions reflects increases of $1,500,000 for research on Sickle Cell disease and $2,000,000 for a detection, prevention, and evlauation program in the fields of respiratory disorders, lipidosis, and coronary artery disease; drug usage in patients with mild hypertension; and for research in blood storage, blood clots, and inherited blood disorders. These increases are partially offset by a $3,000,000 decrease of other Collaborative Research and Development programs of lesser priority.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or to be Taken
1971 House Report	
1. The Committee noted again the rising incidence of lung diseases and suggested that greater emphasis be placed on these disorders in the Institute's research and training programs. (Page 19)	1. The Institute now has on board an Associate Director for Pulmonary Programs who has moved rapidly ahead with scientists and doctors in the commuity to identify critical pulmonary problems, including those in chronic respiratory ailments such as emphysema. One such known problem is the need for more doctors well-trained to treat lung disease. The Institute is establishing a Pulmonary Academic Award Program in response. In specialized research centers pulmonary research has been identified as one of four targeted areas in which such centers will make an important contribution to many unsolved problems. There is being established a Pulmonary Function Laboratory intramurally for basic investigations and collaborative clinical studies are being initiated. It is estimated that there will be an increase in funding in pulmonary research and training of over $10,000,000 between 1970 and 1972 by this Institute.
2. The Committee again noted that arteriosclerosis represents one of this Institute's major research efforts, yet remains the most critical national health problem. The Committee found it disturbing that funds provided in the budget estimate for this program and related work on coronary artery disease are not even sufficient to maintain the 1970 program level. (Page 19,20)	2. The Congress appropriated substantial additional sums for 1971 and the administration provides continued support in 1972 for arteriosclerosis as a new initiative. A more concerted research effort against arteriosclerosis and its complications is being mounted through specialized research centers and the collaborative studies programs. Mainly through these two mechanisms, an additional $10,000,000 is being funded on arteriosclerosis from 1970 to 1972.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or to be Taken
1971 House Report (Continued)	
3. The Committee noted that there may be a correlation between premature arteriosclerosis and elevated blood lipids and that the Institute will attempt to determine appropriate diet and drug treatment to reduce that risk. (Page 19)	3. While it is expected that the reduction of blood lipid levels will reduce the risk of heart disease, this fact remains to be proven. The Institute is establishing new Lipid Research Clinics in 1971 to investigate this problem.
4. The Report noted that the Committee has for the past six years listened to plans that described the desirability of establishing special cardiovascular research centers. The Committee hoped that the budget request of $7,000,000 increase for this item will enable these centers to begin operation. (Page 20)	4. The appropriation for 1971 included a $16,000,000 increase for specialized centers of research (SCOR). The Institute announced to the community plans for centers in arteriosclerosis, thrombosis, hypertension, and pulmonary diseases. Applications are currently being intensively reviewed, with a final review planned at a special National Advisory Heart and Lung Council meeting in May 1971.
1971 Senate Report	
1. It was clear to the committee that there is an urgent need to train clinicians and investigators in the treatment and prevention of lung disease. To that end the Committee directed that some portion of the 1971 appropriation increase be used to launch a suitable training program. The Committee also recommended that part of this increase be used to accelerate and intensify research on the treatment of acute respiratory disease such as emphysema. (Page 35)	1. See item (1) in the 1971 House Report (above).

Significant Items in House and Senate Appropriations Committee Reports

1971 Senate Report (Continued)

Item	Action Taken or to be Taken
2. In reviewing the arteriosclerosis program the Committee noted that the Institute was trying to develop new techniques and instrumentation to measure the severity of arteriosclerotic lesions, and to identify and manage patients susceptible to elevated blood lipids which may cause arteriosclerosis. (Page 35, 36)	2. The Institute through its medical devices applications programs is accelerating research and testing of both circulatory and respiratory assist devices. In the area of lipid metabolism new Lipid Research Clinics are being established. (Also see items (2) and (3) in the 1971 House Report (above).
3. The Committee noted that there has been a substantial decline in the mortality rate from hypertension over the past decade. While drugs are credited for the control of moderate to severe hypertension, little is known of their value to mild hypertension, which is also suspect in its role with coronary artery disease. (Page 36)	3. The Institute has planned a program aimed at preventing heart disease by controlling blood pressure. Hypertension clinical trials are schedueled to commence during 1971.
4. The Committee noted that the need for blood has continued to rise, and in as much as human blood is a limited resource, it is important that it be used as efficiently as possible. To this end the Committee urged increased research for the improvement of transfusion methods, blood storage, and the prevention of blood clots which are a central factor in many cardiovascular diseases. (Page 37)	4. The National Blood Resource Program is very active in these areas. Just completed is a clinical trial on pulmonary embolism using a substance called urokinase, which does dissolve blood clots. The results of this trial have been so promising that a sequential phase is being prepared to compare urokinase with another clot-dissolving product, streptokinase.
5. The Report noted that while there was considerable testimony as to the desirability of establishing cardiovascular research centers, not a single center has been established. The Committee therefore proposes the establishment of such centers. (Page 37)	5. See item (4) of the 1971 House Report (above).

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act Section 301--Research and Investigation, in General	Indefinite	$195,492,000
Title IV, Part B--National Heart Institute	Indefinite	195,492,000

PUBLIC HEALTH SERVICE ACT

Title IV--National Research Institutes, Part B, National Heart Institute

Section 411. There is hereby established in the Public Health Service a National Heart Institute (hereafter in this part referred to as the "Institute").

Section 412. In carrying out the purposes of section 301 with respect to heart diseases the Surgeon General, through the Institute and in cooperation with the National Advisory Heart Council (hereafter in this part referred to as the "Council"), shall--

(a) conduct, assist, and foster researches, investigations, experiments, and demonstrations relating to the cause, prevention, and methods of diagnosis and treatment of heart diseases;
(d) make grants-in-aid to universities, hospitals, laboratories, and other public or private agencies and institutions, and to individuals for such research projects relating to heart diseases as are recommended by the Council... and for the care of such patients therein, as are necessary for such research.
(g) in accordance with regulations and from funds appropriated or donated for the purpose (1) establish and maintain research fellowships in the Institute and elsewhere... and (2) provide training and instruction and establish and maintain traineeships, in the Institute and elsewhere in matters relating to the diagnosis, prevention, and treatment of heart diseases....

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Department Management	-$24,000	To establish the Facilities Engineering and Construction Agency.
Real transfer from:		
National Institute of General Medical Sciences	1,446,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
National Institute of General Medical Sciences	-144,000	To provide an equitable distribution of the Management Fund in 1972.
National Institute of Child Health and Human Development	-36,000	id.
Health Manpower	281,000	id.

Health Manpower	-4,051,000	Transfer of institutional support funds to Health Manpower.
Office of the Director	-71,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director

Comparative transfer from:

National Institute of Arthritis and Metabolic Diseases	78,000	Transfer of regular research grants for the pulmonary research program.
National Institute of Allergy and Infectious Diseases	802,000	id.
National Institute of General Medical Sciences	429,000	id.

National Heart and Lung Institute

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$97,073,000	$105,723,000	$160,100,000	$132,912,000
1963	126,898,000	143,398,000	149,398,000	147,398,000
1964	130,108,000	129,325,000	130,545,000	129,325,000
1965	125,640,000	124,521,000	125,171,000	125,171,000
1966	141,412,000	146,212,000	143,462,000	141,462,000
1967	148,407,000	154,770,000	164,770,000	164,770,000
1968	167,954,000	167,954,000	177,954,000	167,954,000
1969	169,735,000	164,120,000	172,120,000	166,927,500
1970	160,513,000	160,513,000	182,000,000	171,377,500
1971	171,747,000	178,479,000	203,479,000	193,479,000
1972	195,492,000			

Justification

National Heart and Lung Institute

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits............	590	$9,703,000	607	$10,432,000	+17	+$729,000
Other expenses............	--	181,924,000	--	185,060,000	--	+3,136,000
Total....................	590	191,627,000	607	195,492,000	+17	+3,865,000

General Statement

A start has been made on a coordinated attack upon the many different pulmonary disorders which presently cause so much disability and death throughout the country. An associate director for pulmonary programs has been engaged, who is not only outstanding as a physician and medical researcher in the field of pulmonary disease but who is competent in evaluating the needs and potentials in the field and able to initiate and direct new programs aimed at conquering these diseases. Since a dearth of well qualified teachers was identified as the primary obstacle to improving the care and treatment of patients with lung disease as well as uncovering, through research, new ways of treating and preventing these disorders, a new program entitled the Pulmonary Academic Award Program has been initiated to create improved respiratory disease curriculae, to assure that students will receive superior teaching in respiratory diseases, and to encourage, foster, and support the development of respiratory diseases as a sub-specialty, both in areas of research and in patient care. These awards are to be self-limiting in the sense that within five years of a school's receiving such an award the school is expected to underwrite the program for its own merits. $200,000 has been earmarked for this program in 1971. It is expected that this amount may double in 1972.

In the pulmonary area, as well as in the areas of arteriosclerosis, thrombosis, and hypertension, special grants in aid for specialized centers of research are being established, responses have been obtained and are being reviewed with the best to be funded in 1971. Most of these centers are multidisciplinary in nature which means that the talent of various investigators are brought to bear upon problems in the four disease areas identified above. By means of this new mechanism the best trained and most imaginative investigators in the country will be encouraged to direct their efforts to research endeavors which may be expected to provide new preventive measures or new therapies as well as to prototype ways of taking these research findings to the patients who need them. One of the hallmarks of these specialized centers of research will be close cooperation and interaction between the centers and the Institute staff as well as among the centers themselves. Clearly this will demand that the Institute have on its staff a sufficient number of suitably qualified professionals to interact with the investigators in the four different areas, to help keep the programs "on target".

The collaborative programs of the Institute which are funded through research contracts also require close cooperation between the research institutes and the National Heart and Lung Institute. While not new initiatives as such, the emphasis within the Myocardial Infarction Branch upon the prevention of sudden cardiac deaths and the attention of the Medical Devices Applications Program to Test and Evaluation Centers merit emphasis. The question of sudden cardiac death is a particularly difficult and pressing one. Some of these deaths are undoubtedly due to myocardial infarction, others are due to arrhythmias, and still others have a quite unknown etiology. It is obvious that without an understanding of the etiology prevention is impossible. It is also obvious, since many deaths occur within one hour of the onset of symptoms, if not within a very few minutes of the onset of the symptoms, that prevention is the only possible hope.

The Test and Evaluation Centers, while not a new initiative, are something of a new concept in medical research and therefore have required a good deal of managerial development for their implementation. Two of these are now operational and they bear every indication that this particular method of taking the research to the people, of making sure that all reasonable safeguards have been implemented prior to the mass use of new therapies and new devices, will be highly successful.

The clinical applications program has a number of ongoing studies which are detailed in the body of the justification. Clinical trials are a very necessary activity in the spectrum of research, prevention, and patient care. Inevitably they take a number of years to complete and hence there is rarely a breakthrough to report. There is, however, a new program being started in the ascertainment of the beneficial effects of drug therapy for patients living ordinary lives in the community who have high blood pressure. Several centers are to be involved in this trial. They will follow a common protocol, the results will be pooled, and the knowledge gained will be of very practical value to the many thousands of persons who suffer from high blood pressure. Many of those who suffer from early manifestations of the disease, that is to say, who become disabled in their twenties and thirties, are black and these persons particularly should benefit from this trial.

The National Blood Resource Program has recently initiated plans for cooperative studies in the clinical management of sickle cell disease. This disease is almost totally discriminatory on a racial basis, being confined to the black population. It not only markedly foreshortens the life of the sufferer but it imposes unpredictable, repeated crises of pain for which a definitive therapy has yet to evolve. There are some promising therapeutic leads and these are to be explored in the clinical management studies.

Also requiring close collaboration between the Institute staff, specifically the members of the new Lipid Metabolism Branch,and the scientific community is that portion of the new initiative in arteriosclerosis which will establish lipid clinics to bring to the people the benefits of some of our intramural work establishing five different types of blood fat disorders. Each of these abnormalities, two of which are known to precipitate premature heart disease, requires special diets and sometimes special drugs as well. Through these clinics, with new diet booklets and by prevalence studies, the Institute is working closely with the medical community to see that research which is ready to be used to help prevent heart disease is promptly made available to those who need it most.

Similarly, to develop new knowledge and to establish a basis for taking it to the people, a Respiratory Diseases Branch has been established within the Collaborative program. While this is too new to have made any progress as of this date, much is expected of it, particularly in those disease entities which constitute a significant public health problem.

While the initiatives and new findings are important and exciting, they are only one part of the Institute's overall program. A very real effort is being made to maintain a balance in the research directed toward the various diseases which affect the cardiovascular and pulmonary systems and between the various mechanisms used to encourage, foster, and support these activities.

Extramural Programs

The National Heart and Lung Institute administers cardiovascular and pulmonary research and training grant programs of great scope and diversity. Research projects supported range from epidemiological studies of large human population groups to studies of individual cells and cellular components and the biochemical reactions that occur within them. The diversity of this research is dictated by the complexity of the problems posed by the cardiovascular-pulmonary diseases. For the most part, however, their causes are not known with certainty. In many instances a host of complex factors--genetic, environmental, and physiological--seem to operate in their development and in their protean clinical manifestations. The largest percentage of NHLI funds, a requested $140,768,000 is devoted to this effort.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research projects.................	$88,772,000	$93,854,000	+$5,082,000
Special programs..................	29,311,000	27,127,000	-2,184,000
Total, research grants..........	118,083,000	120,981,000	+2,898,000

1,515 regular research grants were supported in 1970 for $82,338,356, approximately 1,488 will be supported in 1971 for $88,772,000, and $93,854,000 is requested for 1972 to support 1,440 grants. These include individual projects, large multidepartmental or multidisciplinary program projects, or parts of large scale cooperative studies and clinical trials. The regular program encompasses six major disease areas toward which program activities are directed and which represent organizational alignment: arteriosclerosis; cardiac diseases; hypertension and kidney diseases; pulmonary diseases; thrombosis and hemorrhagic diseases; and grant programs of a special nature, which include artificial heart and transplantation studies. In addition, in Special Programs, we support a prorated portion of General Research Support Grants, the Cooperative Drug Study, and Specialized Research Centers.

Program Plans for 1971 and 1972

Arteriosclerosis

The support of research in arteriosclerosis continues to be the major orientation of the National Heart and Lung Institute. This includes research into the etiology and pathogenesis, prevention, diagnosis, and treatment of arteriosclerosis, coronary artery disease, peripheral vascular disease, cerebrovascular disease, aging, and disorders of connective tissue of vessels.

It may be of interest to refer to some selected areas of research. Progress on many fronts continues to be made on the elucidation of the hereditary, environmental, dietary, endocrine, hemostatic and local intimal factors concerned in the pathogenesis of atherosclerosis. As new knowledge is obtained, new questions arise.

The thesis that dietary fats are in some manner involved in the pathogenesis of atherosclerosis--which was proposed more than two decades ago--is an assumption underlying much research on atherosclerosis today. While the original hypothesis incriminated the level of fat in the diet, this was subsequently changed to include the chemical nature of the fat: solid, staurated fats were believed to be harmful; liquid, polyunsaturated fats beneficial. Implicit in this concept was the well-documented relationship between the amount and type of dietary fat on the one hand and the blood level of cholesterol and other lipids on the other. And, although not susceptible to direct proof in man, there was strong inferential evidence that high blood levels of cholesterol were concerned with the initiation or progression of atheromatous lesions. Although there have been those skeptical of the validity of these assumptions, it is clear that the dietary fat--hypercholesterolemia--atherosclerosis concept remains the major influence in the planning of research projects in this area.

It has recently been demonstrated in the monkey (Rhesus) that fatty plaques of atherosclerosis induced by dietary cholesterol undergo regression and maturation when the animals are placed on low cholesterol, polyunsaturated fat diets. While the regression phenomenon has thus been demonstrated in a subhuman primate, its nature, mechanisms and limitations remain to be elucidated. The finding has very important implications for the reversal of at least some kinds of atherosclerotic lesions in man.

A large institutionalized human population is under study to ascertain if dietary modification can prevent the occurrence of heart attacks. The study, however, has several years to run and will probably have to be increased in size before a clear answer can be obtained. A study of the effect of several hypocholesteremic drugs is also under test in the Heart Cooperative Drug Study (see Special Programs).

In the area of diagnosis, technical progress has been made with a device which consists of a minute magnet that can be controlled in its passage through the blood vessels, air passages, or intestine. The small, traveling magnet can carry catheters and similar devices into suprisingly small passages and allow special diagnostic measurements to be made from restricted regions of the body. It has been successfully used in the lung and is being developed for use in the cerebral circulation. A second area of diagnostic interest is that of computer recognition and analysis of electrocardiographic data in coronary heart disease. The field is developing a useful degree of sophistication, although practical application is somewhat limited as yet.

In addition to the therapeutic research related to diet and drugs referred to above, the more direct approach of surgical removal or bypass of arteriosclerotic lesions in blood vessels continues to be an active area of research. These techniques, which are successful in the larger blood vessels of the body and legs, continue to be extensively explored in relation to the coronary arteries and the amelioration of coronary heart disease. Technical progress now permits work with vessels with a diameter in the range of 2 millimeters.

The mass of information resulting from projects relating to arteriosclerotic diseases and supported by the NHLI is large. In both fundamental and applied areas, progress toward their prevention and amelioration has been made during the past year.

Cardiac Diseases

This area of research includes cardiac diseases and cardiac arrhythmias, cardiovascular dynamics, heart failure and shock, and congenital and rheumatic heart disease.

Cardiac disease is a rather general category among which studies currently being supported are those dealing with biochemistry and metabolism of heart muscle, electrophysiology of myocardial tissue, effects of anesthetics and trace metals on the heart, and heart sounds and murmurs. In cardiac arrhythmias many of the investigations concern therapeutic approaches, particularly pacemakers and drugs. There is a growing interest in attempting to clarify underlying mechanisms; a number of active grants deal with electrocardiography and vectorcardiography and applications of the computer in this field.

The problems of congestive heart failure and shock are of major clinical importance to the medical community. These are not discrete disease entities but rather symptom-complexes that are the products of severe underlying cardiovascular disease of several etiologies. Circulatory failure may be either acute or chronic in nature. The acute form includes cardiovascular shock, fainting, and often sudden death --due to profound disturbances of heart rhythm and blood pressure. The chronic form of circulatory failure is generally known as congestive heart failure and denotes prolong impairment of the ability of the heart to maintain an adequate flow to the tissues. Most of the Heart and Lung Institute's research grant support in this disease category is concerned with causation. It is not yet known whether heart failure represents a "weakness" of the heart muscle cells or if it is the result of defective energy production or utilization. The answer may be found in intensive studies on the ultrastructure and arrangement of the heart muscle fibers and contractile proteins, or it may lie somewhere in the complex biochemical mechanisms by which the heart generates chemical energy and then harnesses that energy to drive the contractile process.

Despite the many diagnostic and therapeutic advances which have been made in the past 15-20 years, some 35% of babies born with congenital heart disease still succumb to their malformation. A number of these could be saved if they received therapy early enough and the Institute's training programs are attempting to fulfill this need by underwriting the cost of training doctors in the very special techniques which those infants require. However, even when this goal is reached, there will still be a sizeable number of children whose defects are not correctable by surgery and for these understanding of the etiology that prevention may be initiated is the only hope. Accordingly, it is essential that work which is classed as basic research proceeds to uncover the mysteries which now almost completely surround the causes of these malformations.

Hypertension and Kidney Diseases

High blood pressure is the most commonly diagnosed form of cardiovascular disease in the United States. Approximately 22 million adult Americans have hypertension and about 13 million have heart disease as a result of this underlying condition. It is a contributor to the more rapid development of atherosclerosis--a predominant factor in heart attacks, strokes, and diseases of deficient blood supply to other organs.

Great advances in the diagnosis and therapy of hypertension have been made. A wide variety of effective drugs are now being utilized in everyday clinical practice.

Projects in 1971-1972 are devoted to searches for new therapeutic agents, the role of endocrine disturbances in hypertension, more precise chemical and immunologic techniques for the diagnosis of certain types of hypertension, and better understanding of neural factors in the control of blood pressure. Renin-angiotensin mechanisms are under intensive study as are fluid and electrolyte aspects.

Adequate treatment of moderately severe hypertension has been shown to be of striking benefit in terms of mortality and morbidity. Whether the treatment of mild hypertension will result in similar benefits is not known: this is to be the focus of clinical trials to be conducted through the Collaborative R & D activity, 1971-1972.

Pulmonary Diseases

The incidence of respiratory illness, especially chronic obstructive diseases such as emphysema and bronchitis is, unfortunately, increasing in the American population. These diseases are complex and intimately involved with other circulatory and organ systems. Patients usually become chronically sick and debilitated. Specific etiology is obscure in many cases, although environment, heredity, smoking habits, allergy, infection, and metabolic factors are variously involved. Research efforts are diverse and multidisciplinary. The Institute's respiratory disease research program has several foci: chronic obstructive disease, pulmonary vascular disease, lung mechanics and pulmonary physiology.

The Institute's pulmonary research program has centered primarily on chronic lung diseases, pulmonary vascular diseases, pulmonary physiology and, in recent years, lung transplantation.

A good animal model for emphysema studies is needed; those that have been developed to date have a number of shortcomings. One grant recipient is developing a new animal model of experimental emphysema in hamsters.

The study of the role of alpha_1 antitrypsin deficiency in the etiology of pulmonary emphysema gives promise of leading to more significant advances in this field than any other approach that has been tried in recent years. As a result of this, an Institute directed program is to be initiated in 1971 through the contract mechanism in Collaborative Research and Development.

Pulmonary embolism is a serious unsolved problem. Some comparative therapeutic studies are underway to evaluate the efficacy of venous interruption as against the use of anticoagulants.

Several lung transplantation studies are underway. Numerous physiological, neurological, surgical and immunological problems need to be solved. Much additional study will be needed in this field before it will be determined if transplantation can become a practical surgical procedure.

These diseases are considered a vital program area requiring increased national attention and greater research and training support. Since this Institute became the National Heart and Lung Institute, it has, as outlined in the General Statement, brought on board an excellently qualified associate director for pulmonary programs, who is activiating new programs responsible for identifying and improving methods of care for respiratory patients, developing specialized pulmonary centers of research, establishing an intramural pulmonary laboratory, and increasing the number of teachers into this field. Within the past year the number of research grant requests coming to the Institute has increased three-fold. Concurrent with this, the Institute's National Advisory Council has been increased by four additional members representative of the lung community. Accumulation of new knowledge about the respiratory system, both in health and disease, is expected to accelerate in the future with the increased interest in, and the special emphasis on this program.

A problem of critical importance is the need for more doctors well-trained to treat lung diseases. Accordingly, we have established a Pulmonary Academic Award Program which will enable young physicians who have already had training in lung diseases to pursue the solution of these problems and to teach others how to deal with patients who suffer from them.

Thrombosis and Hemorrhagic Diseases

This research area constitutes major health problems in this country. If viewed in an isolated fashion, it could well exceed any other group of pathogenetic mechanisms causing or contributing to morbidity in our population. These disease mechanisms are particularly important in the cardiovascular disease area; their estimated prevalence (potentially or actually) related to coronary-myocardial disease in the population at any one time being over 3,000,000 people. It is estimated that thromboembolic disease accounts for 80% of the stroke population, thrombosis being vastly more important than embolism. Thrombosis is also tremendously important in the field of trauma. Venous thrombosis and embolism is one of the most important causes of death in automobile accidents in patients who survive the initial crash. The extent of the overall problem of hemorrhagic diseases has never been accurately estimated.

The Institute has ear-marked $3,500,000 in its grants' programs in 1972 for research on Sickle Cell Disease. In spite of the large amount of refined molecular knowledge about hemoglobin S, the mechanisms which cause and sustain the painful blood vessel occlusive crisis of this disease are little understood and no treatment of proved efficacy is available for crisis. Estimates of the prevalence of sickle cell trait (gene frequency) range from 8 to 13% of the black population of the United States. Sickle cell disease (homozygous S) occurs in approximately one in 400 of the U.S. black population. This represents a total of some 50,000 sickle cell disease patients in the U.S. today, all of whom have shortened life expectancy and many of whom are plagued by recurrent attacks of painful crisis. Emphasis is now being placed on developing effective treatment methods and preventatives for crisis, on better diagnostic screening methods for both sickle cell disease and trait, and on genetic counseling.

Also in applied research, studies of urokinase, started in 1964 as a basic research project, have culminated in a controlled field trial of pulmonary embolism supported by the National Blood Resource Program. The purpose is to test the efficacy of urokinase in dissolving emboli critically located in the lung vasculature.

Other Programs

The greater part of these programs concern about 30 large multi-categorical program project grants. These are some of the most important programs supported by the NHLI. By virtue of their broad foci on the cardiovascular and pulmonary problems, these programs are not readily identified within the more discrete research areas viewed above.

The transplantation of organs, valves, and vascular segments is practiced widely under a variety of clinical situations. Immunologic rejection remains the most critical factor in this area of clinical application, particularly in the case of heart and lung transplantation. One of the great needs currently is for a more sensitive method of detecting early signs of rejection clinically. Several groups are studying these problems from a basic immunological and physiological approach. Other, larger groups are attacking these problems as part of a continuum of research extending from fundamental studies of prevention to clinical evaluations of transplanted patients, including therapeutic aspects. Solution of the complex picture of cardiac transplantation must be accomplished before this procedure can be expected to realize its potential clinical contribution. Much more effort is required.

Heart Cooperative Drug Study

This study aims primarily to determine whether certain drugs which reduce the concentration of blood lipids are capable of improving survival among patients with overt coronary heart disease. A second objective is to determine whether the degree to which these drugs lower serum lipids is correlated with their effect on mortality and subsequent heart attack rates. Furthermore, the equally intensive study of individuals in the study who do not receive lipid-lowering agents is already providing valuable data on the outlook for men who have recovered from an initial myocardial infarction but are not on lipid-lowering drugs.

The study is underway at 53 participating clinics. Patient recruitment was completed in June of 1969 (over 8,300 patients are enrolled), and the clinical phase of the project will be completed in 1974, by which date all patients will have completed a five-year period of carefully supervised study under one of the described regimens.

Specialized Research Centers

The Institute was provided a substantial amount, over $16,000,000, in 1971 to establish specialized centers of research (SCOR). The Institute has announced to the community its intent to establish a limited number of such centers devoted to the solution of specific, identified, high priority problems in certain disease areas. These four important areas are--arteriosclerosis, hypertension, thrombosis and pulmonary diseases. Applications for these awards are currently under intensive review.

The objective of the establishment of these centers is to focus resources, facilities, and manpower on particular problems and to expedite the development and application of new knowledge essential for improved diagnosis, treatment, and prevention of diseases in these target areas. It is anticipated that these centers will make an important contribution to many of the unsolved problems in these areas.

Changes in 1972

The net increase of $2,898,000 for research grant programs includes a $2,499,000 "built-in" increase for changes in the amounts required to fund in 1972 those project grants which were funded in 1971 and are being continued in 1972 as a part of a commitment made prior to 1972 and program increases of $701,000 for new initiatives of high priority in research on arteriosclerotic and pulmonary diseases and $3,500,000 for basic and clinical research on Sickle Cell disease. There are also reflected decreases of $1,618,000 for programs of lesser priority, $1,324,000 for the Heart Cooperative Drug Study, and $860,000 for general research support grants.

Research Grants Program Analysis
(Based on Estimated Assignment to Program Branches)

	1971 Estimate	1972 Estimate	Increase or Decrease
Arteriosclerosis	$15,358,000	$16,492,000	+$1,134,000
Cardiac diseases	21,039,000	21,126,000	+87,000
Pulmonary diseases	6,036,000	6,373,000	+337,000
Hypertension & kidney diseases	11,985,000	11,867,000	-118,000
Thrombosis & hemorrhagic diseases	12,339,000	15,890,000	+3,551,000
Other cardiovascular and pulmonary programs	22,015,000	22,106,000	+91,000
Subtotal	88,772,000	93,854,000	+5,082,000
General research support grants	8,127,000	7,267,000	-860,000
Scientific evaluation	163,000	163,000	---
Heart cooperative drug study	4,579,000	3,255,000	-1,324,000
Specialized research centers	16,442,000	16,442,000	---
Total, research grants	118,083,000	120,981,000	+2,898,000

Distribution of Research Grants
(Amounts in thousands)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Noncompeting continuations	1,065	$63,935	1,000	$66,434	-65	+$2,499
Competing projects	423	23,192	440	25,775	+17	+2,583
Supplementals	(146)	1,645	(146)	1,645	---	---
Subtotal, regular program	1,488	88,772	1,440	93,854	-48	+5,082
General research support grants		8,127		7,267		-860
Scientific evaluation and planning		163		163		---
Heart cooperative drug study		4,579		3,255		-1,324
Specialized research centers		16,442		16,442		---
Total, research grants		118,083		120,981		+2,898

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Fellowships..............	$6,871,000	$6,195,000	-$676,000

Introduction

The primary objective of the fellowship program is to increase the number of scientists qualified to carry on independent cardiovascular and pulmonary research. The fellowship programs are an integral part of the Institute's training effort.

Program Plans in 1971 and 1972

The above objective is carried out through four means: (1) the postdoctoral fellowships are awarded in a wide variety of cardiovascular disciplines to encourage young physicians and scientists to obtain research training and experience so that the country's research potential can be maintained; (2) special fellowships are awarded to more mature individuals, often faculty members, who find it highly productive to spend a year or two in research laboratories other than their own in which they can improve current skills or acquire new ones; (3) the highly successful research career development program supports the younger investigator of demonstrated ability and provides the means whereby the grantee institutions can expand their cardiovascular potential; (4) the research career award provides stable support for the senior investigator.

Funds requested for 1972 will provide for 255 awards, compared to 339 in 1971, a decrease of 84.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting.............	214	$4,973,000	200	$5,031,000	-14	+$58,000
Competing................	23	508,000	22	546,000	-1	+38,000
Supplementals.............	(15)	30,000	(10)	20,000	(-5)	-10,000
New.......................	102	1,360,000	33	598,000	-69	-762,000
Total, fellowships........	339	6,871,000	255	6,195,000	-84	-676,000

Fellowships (By Type of Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Postdoctoral...............	64	$537,000	27	$238,000	-37	-$299,000
Special....................	91	1,220,000	45	687,000	-46	-533,000
Research career development.	157	4,291,000	157	4,451,000	0	+160,000
Research career............	27	823,000	26	819,000	-1	-4,000
Total, fellowships........	339	6,871,000	255	6,195,000	-84	-676,000

Fellowships Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
	Amount	Amount	Amount
Arteriosclerosis....................	$1,320,000	$1,189,000	-$131,000
Cardiac diseases....................	2,459,000	2,218,000	-241,000
Pulmonary diseases..................	1,031,000	929,000	-102,000
Hypertension and kidney diseases.....	948,000	855,000	-93,000
Thrombosis and hemorrhagic diseases..	831,000	750,000	-81,000
Other cardiovascular programs........	282,000	254,000	-28,000
Total, fellowships..................	6,871,000	6,195,000	-676,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total training grants............	$13,592,000	$13,592,000	---

Program Plans in 1971 and 1972

During the Institute's 22 years, some 17,000 postdoctoral investigators have been trained in all different facets of cardiovascular and pulmonary diseases. Initially, the emphasis was mainly upon teaching fundamental research; more recently a special emphasis has been put upon the development of physicians oriented toward clinical research. In total some 75% of the trainees have been physicians.

In judging the "success" of a training program, there is a natural and perhaps unavoidable tendency to assess the number of people who actually pass through the program and by the proportion of these who subsequently become renowned investigators. Certainly these are two measures which can be used, but the real hallmark of the success of the training programs is the new knowledge which skilled cardiologists and cardiac surgeons daily apply in the treatment of the cardiac ills of patients throughout the country. This new knowledge and these new skills have been many. But a well-trained investigator and clinician is not the final, completed end-product of the training program. As these men and women practice their skills they enlighten and train those with whom they work, whether or not they are engaged in a formal teaching program. Just as yeast must continually be allowed to regenerate itself, so it is essential to keep replenishing the corps of highly trained cardiovascular and pulmonary physician-researchers that new drugs, new diagnostic and therapeutic tools, new methods of prevention may, like loaves of bread, be available for distribution to those with or at risk of heart disease. Furthermore, by their presence in the scientific and medical community, the well-trained cardiologist, cardiac surgeon, and cardiac researcher help maintain standards of excellence in medical care which the American people have come to, and have a right to, expect.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting................	315	$10,735,000	314	$11,292,000	-1	+$557,000
Competing...................	42	2,082,000	40	2,000,000	-2	-82,000
Supplementals.................	(17)	150,000	(16)	100,000	(-1)	-50,000
New.........................	14	625,000	5	200,000	-9	-425,000
Total, training grants......	371	13,592,000	359	13,592,000	-12	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	358	$5,841,000	369	$6,225,000	+11	+$384,000
Other expenses...........	--	10,520,000	--	10,912,000	--	+392,000
Total.................	358	16,361,000	369	17,137,000	+11	+776,000

Experience has taught that in studying a complex problem there is danger in directing a total program toward the solution of specific questions because of the danger of having asked the wrong questions. As a corollary, the big discoveries are repeatedly found in unanticipated places. Therefore the Institute has deployed part of its resources to provide the environment to attract and hold the kind of mind that provides such discoveries. Within the framework of seeking fundamental knowledge of disease process, basic studies comprise a significant portion of the Intramural program. Such studies range from study of the subtle biochemical mechanisms controlling the central and autonomic nervous systems to a study of the basic functioning of the primitive cell. The balance and major portion of Intramural Research is directed specifically toward a solution to the various forms of cardiovascular distress. Because of the recognized excellence of its programs, the Institute also attracts many trainees, who, after accelerated and intensive training, return far better equipped for research in the medical and scientific communities.

One hundred hospital beds are at the disposal of the clinical program and support studies involving diagnosis, surgical repair, metabolic investigations related to studies of arteriosclerosis, other circulatory diseases and studies of hypertension. Support is given also by a vigorous out-patient program with approximately 5,000 visits by patients (within the above and related categories) to clinics related to the studies of staff members of five of the intramural branches.

Pulmonary diseases are a matter of growing concern. Relatively little is known about the visceral functions of the lung; how the lung metabolizes the important peptides, amines and other chemicals in the blood and the importance of this to diseases of lung circulation and to emphysema and other mechanical defects. There is an increasing interest in the lung in the Intramural program where a new type of artificial lung has been developed. When fully developed, its use will be particularly applicable to treat hyaline membrane disease which kills approximately 20,000 American infants a year.

The total increase of $776,000 includes a program increase of $118,000 and 11 positions for full implementation of an intramural pulmonary laboratory and for increased activity in the study of lipidosis and in coronary artery disease in conjunction with the Collaborative Research and Development program.

There are also increases of $207,000 for annualization of 1971 pay increase costs, $98,000 for within grade pay increases, $16,000 for one additional day of pay in 1972, and $337,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	40	$783,000	46	$911,000	+6	+$128,000
Other expenses..........		29,829,000	--	30,255,000	--	+426,000
Total.................	40	30,612,000	46	31,166,000	+6	+554,000

This activity was expanded in 1971 and will continue in 1972 to include programs in (1) medical devices applications, (2) myocardial infarction, (3) blood resources, (4) clinical applications, (5) lipid metabolism, and (6) respiratory diseases.

Medical Devices Applications Program

The mandate of what was formerly called the Artificial Heart Program has been broadened to include the development of devices needed to support patients with chronic lung disease and the name of the program has been changed to the Medical Devices Applications Program.

In planning the work needed from research and development groups, the program uses a modified systems development approach rather than the sequential step-by-step approach which is customary in the medical field. As opposed to sequential development, systems development is an approach whereby all sub-systems are considered concurrently and their design, development, testing and assemblage into complete, workable systems is achieved by the coordinated and directed efforts of various individuals and institutions, each concentrating on specific problems lying within a particular area of expertise. By thus bringing together the biomedical skills in medical schools and hospitals and the talents of university physical and engineering scientists, the chemical industry, engineering and actuarial firms,and other groups from private industry--and coordinating the efforts of these participants--the program expects to produce the most reliable and beneficial types of circulatory assist and cardiac replacement systems, as well as respiratory assist devices including oxygenators, at minimal cost in time and money.

In 1971 directed and goal-oriented research and development has been continued under contract in the following areas: development of circulatory assist devices, physiologic effects of devices in animals, development and evaluation of materials for use in circulatory assist devices, effects of additional endogenous heat, cardiac control parameters, blood flow studies, development and testing oxygenators, instrumentation, biological fuel cells, and energy systems.

There are now a number of new materials developed for artificial organs which seem to work well when made up into these devices and possess that most critical property, not causing damage to the blood. The next hurdle to be met with these materials is to determine how well they stand up under use and how well the body responds after having had them implanted.

Another important program development has been the establishment of two test and evaluation facilities to ensure that materials, components, and devices developed by the program are adequately and systematically tested before they are considered for clinical use. The central purpose of the test and evaluation effort is to assure both the scientific community and the Government that the product is safe, effective, and reliable. This will also provide physicians with the basic information they need about the device and its application. By thus accelerating acceptance of a device or system, adequate testing and evaluation will speed the results of research to the patient and shield him from the hazards of inadequately tested modes of therapy.

Myocardial Infarction

The Myocardial Infarction Branch has the responsibility for the design and administration of a national research program leading to the reduction of death and disability from heart attack. The program is fostering the development of new knowledge and the translation of results into methods which will have wide clinical application.

To achieve these goals, the program has sought to focus the attention of the scientific community upon heart attack, and it has attracted new people and new disciplines to work upon the problem. Broad multi-disciplinary research programs have been established, as well as projects of limited scope and short-term goals. Special resources to facilitate research upon heart attack are being developed. Cooperation and communication have been fostered among participants. Effective techniques for targeting and structuring research are evolving.

To study the acute illness in the hospitalized patient, nine Myocardial Infarction Research Units are now active. Each has a multi-disciplinary program emphasizing clinical investigation, supported by more fundamental studies. They are designed to answer specific questions about the disease process and its therapy; at the same time, they are to nurture creative research upon the problem of heart attack. The basic measurements and historical information which characterize the patients coming into the studies and during the investigations have been standardized; however, the specific research projects of each MIRU are varied since they are designed to capitalize upon the unique resources and interests at each institution and thus provide a broad and balanced total program.

These units are continuing to provide new knowledge as to how best to care for patients who arrive at a hospital having had a heart attack. New methods have been developed for determining the size of the infarct, new ways of measuring changes in the patient's blood pressure, his cardiac output and the amount of oxygen carried in his blood, as well as new methods of determining how well the patient is responding to treatment.

Sudden death within minutes of the onset of symptoms accounts for a very substantial fraction of the deaths from heart attack; indeed, more than half of the deaths occur before hospitalization. A number of programs are being supported which directly concern those patients who do not live long enough to get to a hospital to have their heart attack cared for.

National Blood Resource Program

This program was established in response to a critical problem relative to the national supply of transfusion blood and blood components. Specifically, a rapid acquisition of scientific information regarding fractionation techniques resulted in an increasing identification of the cellular and protein components of blood as therapeutically useful. However, there was at that time and there remains today a serious technological lag which prevents the large-scale application of this knowledge. The problem is made more acute because requirements for blood have increased significantly during the past few years and will continue to rise. As human blood is a limited resource, it is most important that it be used as efficiently and effectively as possible. The program is working actively on the improvement of transfusion methods, on blood storage and preservation, and on ways of breaking blood up into its component parts so that patients who do not need whole blood but who need only one fraction can receive only the required fraction, leaving the rest for other patients who need other fractions.

There has been an acceleration of research on the prevention of blood clots which are a central factor in many cardiovascular diseases, as well as in lung diseases. The program has just completed a clinical trial in pulmonary embolism using a substance called urokinase, which dissolves blood clots. The results of this trial have been so promising, that a sequential phase is being prepared to compare urokinase, which is a product isolated from human urine, with another clot-dissolving drug streptokinase, which is made from a particular species of bacteria. Streptokinase is much easier to manufacture and hence, would be much less expensive. Attempts are also being made to reduce the cost of urokinase.

The National Blood Resource Program has also contributed to the multifaceted attack on the problem of hepatitis, a serious liver disease, which can be acquired from blood transfusions. New tests are being refined which will detect the presence of hepatitis virus in blood so that contaminated blood will not be used for transfusions.

One particular group of individuals who often need large numbers of transfusions of whole blood are patients with sickle cell disease. This disease is limited to black people and may affect as many as 1,000 babies born each year. A number of new leads for treating these patients have recently emerged. The National Blood Resource Program plans to initiate tightly controlled and experimentally and statistically well designed clinical investigations to determine which of these is best.

Clinical Applications

Hypertension, by itself, constitutes a major health problem. However, it also appears to enhance the risk in coronary heart disease. Thus, control and prevention of hypertension offers another potential path for the prevention of coronary heart disease. Studies conducted in Veterans Administration hospitals have provided strong indications that under the particular conditions of the VA study, blood pressure can be controlled and the complications of high blood pressure prevented. Proof that controlling blood pressure will reduce heart attacks has yet to be established as has the feasibility and the efficacy of giving the drugs to patients who are living in different parts of the country, working at many different types of jobs, being of different ages, and, perhaps most importantly of all, not being under the strict management of a controlled clinical trial as was the case in the VA study. The Institute plans to continue clinical trials in hypertension in 1971-1972.

Lipid Metabolism

Within the purview of the new Lipid Metabolism Branch, lipid research clinics will be established throughout the country to develop the most practical means of mass ascertainment of the patients with lipid disorders that presage heart attacks while attempting to determine just how many people there are at such risk in the country.

Respiratory Diseases

A study will be initiated in 1971 to determine how many people there are in the community who have a genetic predisposition to lung disease by virtue of the fact that they lack a particular enzyme called alpha_1 antitrypsin. It is known that patients who inherited this abnormality from both parents have more lung disease than other people in the community but it has not been yet determined how many people there are who inherited it from only one parent, and why only some of them have lung disease. It appears that certain factors in the environment, particularly certain kinds of work, may be especially harmful for these individuals.

Changes in 1972

The net increase of $554,000 and 6 positions reflects increases of $1,500,000 for research on sickle cell disease and $2,000,000 for a detection, prevention, and evaluation program in the fields of lipidosis, coronary artery and pulmonary disorders; drug usage in patients with mild hypertension; and for research in blood disorders and blood clotting. These increases are partially offset by a $3,000,000 decrease of other Collaborative Research and Development programs of lesser priority.

There are also increases of $38,000 for annualization of 1971 pay increase costs, $9,000 for with-in grade pay increases, $2,000 for one additional day of pay in 1972, and $5,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Biometry, Epidemiology, and Field Studies

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	64	$1,081,000	64	$1,126,000	--	+$45,000
Other expenses...........	--	909,000	--	922,000	--	+13,000
Total..................	64	1,990,000	64	2,048,000	--	+58,000

This activity undertakes research into the etiological factors relating to cardiovascular disease in general population groups and evaluates the therapeutic effectiveness of new drugs, products, or measures which may have promise for the prevention or treatment of cardiovascular disease. A very important responsibility is for conducting or cooperating in clinical trials or controlled therapeutic evaluations of new agents or measures for the prevention or treatment of cardiovascular disease. These studies are funded by both grant and contract mechanisms, so that full range of program capability is available. This activity consists of three branches: Therapeutic Evaluations, Epidemiology, and Biometrics Research.

The Institute's responsibilities for liaison and monitoring of the Coronary Drug Project and other grant-supported cooperative clinical trials are implemented by the Therapeutic Evaluations Branch. Further knowledge of risk factors as well as of protective factors in coronary disease are being gained from population studies conducted by the Epidemiology Branch.

The increase of $58,000 includes $27,000 for annualization of 1971 pay increase costs, $15,000 for within-grade pay increases, $3,000 for one additional day of pay in 1972, and $13,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	72	$1,010,000	72	$1,149,000	--	+$139,000
Other expenses...........	--	1,659,000		1,737,000	--	+78,000
Total..................	72	2,669,000	72	2,886,000	--	+217,000

This activity provides professional direction for the scientific review and administration of most grant supported cardiovascular and pulmonary research and training programs, including the necessary operational and technical support activities and scientific and financial analysis of such programs.

The increase of $217,000 includes $112,000 for annualization of 1971 pay increase costs, $23,000 for within-grade pay increases, $4,000 for one additional day of pay in 1972, and $78,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	56	$988,000	56	$1,021,000	--	+$33,000
Other expenses...........	--	461,000	--	466,000	--	+5,000
Total.................	56	1,449,000	56	1,487,000	--	+38,000

This activity provides support for the Institute Director and his immediate staff, the Office of Administrative Mangement, the Office of Program Planning and Evaluation, and the Office of Heart and Lung Information. Funds support the over-all administration, coordination, and direction of the varied programs and activities of the Institute. The Director and his staff are responsible for introducing new knowledge into current operating programs and for the planning, development, and review of new areas of focus and interest.

The increase of $38,000 includes $23,000 for annualization of 1971 pay increase costs, $8,000 for within-grade pay increases, $2,000 for one additional day of pay in 1972, and $5,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$118,083,000	Indefinite	--	$120,981,000

Purpose: This activity funds project grants to assist public and other non-profit research institutions to establish, expand, and improve research activities related to diseases of the cardiovascular and pulmonary systems.

Explanation: Research projects supported range from epidemiological studies of large human population groups to studies of individual cells and cellular components and the biochemical reactions that occur within them. The diversity of this research is dictated by the complexity of the problems posed by the cardiovascular-pulmonary diseases.

Accomplishments in 1971: In 1971 an estimated 1,488 regular research grants will be awarded to increase scientific knowledge and find more effective means of prevention, diagnosis, and treatment in such areas as arteriosclerosis, cardiac diseases, pulmonary diseases, hypertension and kidney diseases, and thrombosis and hemorrhagic diseases.

Objectives for 1972: Recent in-depth surveys of where the Nation stands now in its cardiovascular research accomplishments show the time is ripe to reap the benefits of research accomplishments engendered over the past 20 years, particularly in the field of arteriosclerosis and the diseases it causes. In 1971-1972 increases of $16,000,000 have been provided for the operation of specialized centers of research in arteriosclerosis, thrombosis, hypertension, and pulmonary diseases. It is anticipated that these centers will make an important contribution to many of the unsolved problems in arteriosclerosis and related diseases. An estimated 1,440 research grants will be supported in 1972.

Activity: Fellowships. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$6,871,000	Indefinite	--	$6,195,000

Purpose: This program supports advanced research training of qualified scholars for research and academic careers in the basic and clinical sciences related to the cardiovascular and pulmonary areas; and thereby increases the number of trained research investigators and teachers in these fields.

Explanation: The program sponsors advanced research training for individuals whose career development extends from the immediate post-doctoral period through the advanced stages of research attainment. Fellowship awards are made directly to individuals, not to institutions, and consist of stipends, dependency allowance, tuition and fees, and travel costs.

Accomplishments in 1971: An estimated 339 fellowships will be awarded (64 postdoctoral, 91 special, 157 research career development, 27 research career). The Institute recently undertook a follow-up study of 12,000 individuals who have received research training support through fellowships and graduate training grant programs. A preliminary evaluation of the accumulating data reveals that the majority of individuals supported are now in academic positions. A significant number have competed successfully for their own research grant support and are directors of their own research training programs.

Objectives for 1972: Under the reduced budget an estimated 255 fellows will be supported. A continuing priority will be improving the research capability of investigators in arteriosclerosis and cardiac diseases, and other cardiovascular and pulmonary areas.

Activity: Training Grants. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$13,592,000	Indefinite	--	$13,592,000

Purpose: Training grants provide support for the establishment, improvement, or expansion of training programs to prepare scientists for research and academic careers in the cardiovascular and pulmonary fields.

Explanation: Graduate training grants are intended to suppport the direct costs of a formalized training program (including stipendiary support to named postbaccalaureate trainees), plus indirect costs, currently limited to 8% of direct costs.

Accomplishments in 1971: During the Institute's 22 years, some 17,000 post-doctoral investigators have been trained in all different facets of cardiovascular and pulmonary disease. Initially, the emphasis was mainly upon teaching fundamental research; more recently a special emphasis has been put upon the development of clinically oriented physicians. In total some 75% of the trainees have been physicians. In 1971 some 1,020 trainees will be supported through 371 grants.

Objectives for 1972: In 1972 an estimated 972 trainees will be supported through the graduate research and clinical training programs.

Activity: Laboratory and Clinical Research. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
358	$16,361,000	Indefinite	369	$17,137,000

Purpose: This is a directed research program within the facilities of the NIH at Bethesda. Within the framework of seeking fundamental knowledge of disease process, basic studies comprise a significant portion of the program. Such studies range from study of the subtle biochemical mechanisms controlling the central and autonomic nervous systems to a study of the basic functioning of the primitive cell. The balance and major portion of research is directed specifically toward a solution to the various forms of cardiovascular distress. Because of the recognized excellence of its programs, the Institute also attracts many trainees, who, after accelerated and intensive training, return far better equipped for service in the medical and scientific communities.

Explanation: The Institute has 358 positions for this activity, of which about half are for scientists and physicians and the remainder for technical personnel. Basic and clinical research is carried on in 13 major laboratories and branches. One hundred hospital beds are at the disposal of the clinical program. Support is given also to a vigorous out-patient program with approximately 5,000 patient visits annually.

Accomplishments in 1971: The findings of intramural scientists have exerted profound effects in major areas of cardiovascular research. Current efforts include the study of blood lipids directed toward an understanding and control of arteriosclerosis; continuing efforts in the use of enzyme inhibitors and drugs in the treatment of hypertension; continuing contributions to the understanding of nerve and hormonal factors in heart performance, and the mechanisms by which the autonomic nervous system and various cardiac stimulants provide support to a failing circulation; developing important new techniques for the detection and clinical evaluation of various types of congenital and acquired heart disease (an enviable record of success has been compiled in the surgical treatment of these disorders); and continuing definition of the complex processes involved in the synthesis, transport, and metabolism of cholesterol and other fats.

Objectives for 1972: A continuing priority will be maintained in the excellence of the research projects described above. There is requested a program increase of 11 positions and $118,000 for full implementation of an intramural pulmonary laboratory and for increased activity in the study of lipidosis and in coronary artery disease in conjunction with the Collaborative Research and Development program.

Activity: Collaborative Research and Development. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
40	$30,612,000	Indefinite	46	$31,166,000

Purpose: This activity supports research and development in (1) medical devices applications, (2) myocardial infarction, (3) blood resources, (4) clinical applications, (5) lipid metabolism, and (6) respiratory diseases.

Explanation: These projects are supported through contracts performed in collaboration with other Federal agencies, university and medical school research centers and industrial research organizations. All funds are used to support scientific research into the causes, prevention, diagnosis and treatment of cardiovascular and lung diseases.

Accomplishments in 1971: Mecical devices applications broadened to include the development of devices needed to support patients with chronic lung disease, specifically in oxygenator fabrication, new and improved oxygenators, and analysis of respiratory assist program. New programs initiated in myocardial infarction include interventions to minimize infarct size and enhance repair, methods of quantifying infarct size in the clinical setting, and programs on sudden cardiac death and the onset of myocardial infarction. The blood program will expand or initiate work in the study of blood banking and hematherapy, in the identification and control of hepatitis, for MI and platelet antiaggregating agents in thrombosis, in hereditory blood disorders, in urokinase production, and in white cell transfusions. There will be a major hypertension clinical trial initiated in clinical applications, as well as lipid research clinics. The respiratory disease area will initiate a study of alpha$_1$ antitrypsin deficiency.

Objectives for 1972: The new programs initiated in 1971 and itemized above will be continued as need and new programs begun in sickle cell disease and new iniatives in arteriosclerosis.

Activity: Biometry, Epidemiology, and Field Studies. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
64	$1,990,000	Indefinite	64	$2,048,000

Purpose: This activity undertakes research into the etiological factors relating to cardiovascular disease in general population groups and evaluates the therapeutic effectiveness of new drugs, products, or measures which may have promise for the prevention or treatment of cardiovascular disease.

Explanation: This research is conducted partly by in-house staff scientists (and includes a biometrical group) and partly through contract to other research organizations. Organizationally, it now has responsibility for liaison and monitoring of the Heart Cooperative Drug Study and other grant-supported cooperative clinical trials.

Accomplishments in 1971: This activity will continue research as described under "Purpose".

Objectives for 1972: The high level of research will be maintained. Additional emphasis will be focused on clinical trials or controlled therapeutic evaluations of new agents or measures for the prevention or treatment of cardiovascular disease.

Activity: Review and Approval of Grants. (Public Health Service Act, Section 301, Title IV, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
72	$2,669,000	Indefinite	72	$2,886,000

Purpose: This activity provides professional direction for the scientific review and administration of most grant-supported cardiovascular and pulmonary research and training programs, including the necessary operational and technical support activities and scientific and financial analysis of such programs.

Explanation: Funds are made available to the Associate Director for Extramural Programs to provide scientific and administrative direction of grant programs. This includes scientific evaluation, administrative grants' management, and grants' processing activities.

Accomplishments in 1971: This activity handles the processing of all NHLI grants following the primary review process. In addition, it provides important aspects of program stimulation and formulation. If we can view this activity as "overhead", its funds were about 2% of the entire grant program. The staff of this activity reviewed some 1,500 new and competing renewal research grant, training grant, and fellowship applications for scientific merit and program relevance and maintained surveillance over some 2,250 research and training projects which are to be funded in 1971.

Objectives for 1972: The activities of 1971 will be continued.

Activity: Program Direction. (Public Health Service Act, Section 301, Title IV, Part B)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
56	$1,449,000	Indefinite	56	$1,487,000

Purpose: This activity provides support for the Institute Director and his immediate staff, the Office of Administrative Management, the Office of Program Planning and Evaluation, and the Office of Heart and Lung Information.

Explanation: Funds support the over-all administration, coordination, and direction of the varied programs and activities of the Institute. The Director and his immediate staff are responsible for introducing new knowledge into current operating programs and for the planning, development, and review of new areas of focus and interest.

Accomplishments in 1971: This year is seeing a greatly accelerated research program throughout the Institute on lung diseases. Within the Office of the Director there has been recruited an Associate Director for Pulmonary Programs who has moved ahead rapidly with scientists and doctors in the community to identify critical problems in this area.

Objectives for 1972: Continued leadership will be provided for: the establishment of the new specialized centers of research; the varied range of research endeavor in the pulmonary field, including the new Pulmonary Academic Award Program to help provide the need for more doctors well-trained to treat lung disease; a coordinated effort for therapy in sickle cell disease; new programs in clinical applications in lipid metabolism and in hypertension; as well as the continuing cross section of quality research and training supported by the Institute.

New Positions Requested

Fiscal Year 1972

	Grade	Number	Annual Salary
LABORATORY AND CLINICAL RESEARCH			
Scientist	Full	3	$34,668
Scientist	GS-15	1	24,411
Scientist	GS-14	1	22,918
Scientist	GS-12	1	18,449
Scientist	GS-9	1	11,526
Scientist	GS-7	2	20,516
Clerical assistant	GS-6	1	7,294
Animal caretaker	WB-3	1	5,212
		11	144,994
COLLABORATIVE RESEARCH AND DEVELOPMENT			
Scientist	GS-15	1	24,411
Scientist	GS-13	2	42,464
Public health program specialist	GS-12	2	28,384
Scientist	GS-7	1	10,282
		6	105,541
Total new positions, all activities		17	250,535

National Heart and Lung Institute

STATEMENT OF DR. THEODORE COOPER, DIRECTOR

ACCOMPANIED BY LYMAN MOORE

BUDGET REQUEST

Senator Magnuson. The National Heart and Lung Institute will be next.

Go right ahead, Dr. Cooper.

Dr. Cooper. Mr. Chairman, I will try to summarize a few highlights.

To begin, the National Heart and Lung Institute is requesting $195,492,000 for fiscal 1972, a level designed to help us stay even with our efforts to carry on our role in the fight against diseases of the heart, lungs, blood vessels, blood clotting systems, and sickle cell disease—a group of diseases which cause more deaths annually in this country than all others, including cancer.

The funds provided by the Congress last year enabled us finally to initiate our system of specialized centers of research in arteriosclerosis—hardening of the arteries; chronic and obstructive diseases of the lungs—emphysema, bronchitis; thrombosis—occlusion of blood vessels by blood clots; and hypertension—high blood pressure.

It also permitted us to begin our program of lipid (fat) metabolism research clinics—of high blood pressure surveys and clinics—and to undertake a concentrated effort on the study of premature sudden death. In addition, we have initiated some pilot studies in the treatment of sickle cell anemia. There are many other accomplishments of note which we could list, for example, the ability to provide for transfusion of blood platelets for a total of 4 days instead of 6 hours, reduction of hospital mortality from heart attacks in coronary care units by about 23 percent, and the availability of new techniques for operating on people with angina pectoris and coronary artery disease in numbers exceeding 20,000.

Our concern with the problem of heart disease will continue to focus on the problem of heart attacks due to arteriosclerosis or hardening of the arteries. We need to find out how many people are subject to abnormalities of fat metabolism—as these would be reflected in high values of their blood cholesterol.

We need to find out whether lowering their blood chloresterol by diet or drugs or surgery will protect them against having premature heart attacks. This calls for a test of the lipid hypothesis of arteriorsclerosis. Furthermore, we need to get on with finding out how to reduce heart attacks associated with smoking—to control high blood pressure and to control cholesterol—and how all these altogether will affect the so-called epidemic of premature heart attacks.

We also have a new program in chronic lung disease. Not only do we need to help provide more experts, more people for the treatment of patients with these maladies, we need to study the natural history of these problems. We need a new effort in the etiology of chronic lung disease, and we need new efforts in the treatment of the desperately ill breathless patient in pulmonary intensive care centers. We need new techniques for the early detection of people with chronic lung disease so that we can offer them prevention earlier.

As you will recall from the President's Health Message, we will also start a new interagency effort in sickle cell disease. This disease is predominantly a disease of black people that is transmitted genetically. We have new treatments to test, new basic work to do, and we need to seek out and advise those who have the disease and who carry the trait as to what they best should do.

We have a large number of other responsibilities, Mr. Chairman, which we shall make every effort to continue to meet. For example, some of these are to find new ways to help the 17 million to 22 million Americans with high blood pressure; to find new treatments for heart failure and shock; to find new ways to evaluate new operations for heart disease; to find new ways to improve and make safer our blood banking and our blood transfusion capability; to find new and better ways to treat abnormal beats of the heart, the so-called problem of arrhythmias; to learn more about diseases of the lung in childhood so that we can prevent debilitating disease in adults; to develop new methods to detect lung function abnormalities earlier in the disease process.

MILESTONE IN ARTIFICIAL SYSTEMS

We hope to reach a milestone in our progress on artificial systems or mechanical systems for helping the heart or even replacing the heart, the so-called artificial heart program.

Finally, we need to test very soon, new agents for dissolving blood clots in patients who have had heart attacks. I will be pleased to expand on any of these areas or any areas of the Institute's programs in general.

Senator MAGNUSON. I just have two or three questions here.

One thing that bothered me is that you only show a net increase of about $341,000 in heart and lung research. Considering the total of $165 million and other factors, doesn't this amount to a cut in the long run?

Dr. COOPER. The increase which we show over last year in proposed obligations would be administrative costs which would take care of the pay raise and the annualization of new positions.

Senator MAGNUSON. But that is all?

Dr. COOPER. Yes, sir.

Mr. MILLER. Mr. Chairman, the statement that Dr. Marston made this morning probably applies as much to this Institute as any other. We asked the Congress last year for $171.7 million for this Institute. The House raised it to $178.5 million. It was at that point that we were completing our 1972 budget and asked the OMB for $180.6 million. This represented an increase over the base figures we were using at that time.

In between that point in time and the final appropriation action, the appropriation was raised to $193 million. That was the final appropriation. We accepted that and we brought the President's 1972 request up to the level that the Congress had appropriated in 1971. This meant that over a period of 2 years we have come up $35 million for this Institute, which I think is a better timespan than simply looking at the difference between the time the Congress appropriated and the time the President's budget was finally submitted.

Senator MAGNUSON. I understand that. Of course, I did not think the amount last year was enough personally. It seems to me that in this program we should not stand still.

Now we do have already a lot of people talking to us—unfortunately this is true—if you increase cancer, why don't you do the same for heart and lung if you can do a job there, too?

SELECTING AREAS OF INCREASE

The only answer we have is that we should have a sufficient amount, for this and if something exciting shows up here which is a little different than other research that is being done, we should see that you could start that special program.

Of course, that is the critical business of picking out one against the other.

Dr. MARSTON. As I said this morning in talking about this, it is just this that concerns me. There are exciting areas of research in the heart area that are, in fact, comparable—in terms of their implications for large numbers of American people—to the advances in cancer.

The President in explaining making his choice when he went before the press, why he chose cancer—you remember he said it was the basis of his personal decision and his personal interest. It would be very unfortunate, I think, to give people the idea that there are more exciting research opportunities in cancer than there are in heart today. From my assessment, this just isn't true.

Dr. COOPER. That is correct.

Senator MAGNUSON. There was nothing much new in the President's health message except he indicated he might be a little more lenient budgetwise. That is all. He might give a little budgetwise.

We have talked about $50 to $100 million more on cancer every time the last 4 or 5 years, but we never could get it over these budget fellows or over the President. In other words, he said that the budget is going to be more lenient.

We could just as well put the $100 million in this bill, without any additional legislation for cancer, or put $50 million in heart. I think what he did was suggest that they are not going to be as tight or tough on health budgets. A lot of us have been thinking that for a long time subject to advice from you people, and others who are expert in biomedical research.

It seems to me that on your research there that you are pretty much standing still. Now if there are some opportunities for accelerating progress, we ought to know about them if they need money. I do not mean that we would just throw it around or anything like that, but sometimes a small amount goes a long way in a program.

The committee will talk about that. I am sure we are going to be asked by members of the committee and others to suggest an increase in heart and lung.

Now I have to vote and Senator Cotton is not back yet, so we will just have to take another seventh-inning stretch until Senator Cotton comes back.

(A brief recess was taken.)

Senator COTTON (presiding). The committee will be in order.

Dr. Cooper, I understand you haven't quite completed your testimony. You may proceed.

LUNG RESEARCH

Dr. COOPER. There are two general areas that I think I would like to comment on, Mr. Chairman. That relates, first, to the new lung program which was begun in the Institute in November 1969. We are often asked whether we have, in fact, been able to accomplish any new initiative or accelerate progress in the area of emphysema and bronchitis.

I would like to report that with the funds that were made available during the past year we have been able to initiate new programs in lung research. More than that, we have been able to try to address ourselves to the problem of enrichment of areas in which there is a deficiency of experts, both clinical experts and researchers, in the lung field by initiation of new programs in pulmonary academic awards which would help us develop a community of scientists in order to provide the personnel base to help this important area grow.

The second point I would like to make relates to the importance of the development of the pulmonary intensive care concept very much as we experienced, in the last decade, is the coronary concept, the intensive care unit and the impact that that had both on the diagnosis and treatment, as well as on the stimulation of important new research for this field.

We have been very pleased to have been able to initiate this new facet of our program.

In the heart area I want to amplify a little bit what Dr. Marston referred to in his comments a few moments ago, that in the heart area there are new opportunities, exciting new opportunities, for progress which in a reasonable period of time could be expressed by improvement in the public health of the American people, hopefully by reducing mortality from premature heart attacks in this country.

During the past decade we have learned a great deal about the relationship of not smoking cigarettes, of high blood pressure, of high blood fats or lipids and cholesterol on the risk of having a heart attack. We recognize now that if you have these factors in an American male between the age of 34 and 60, the chances of having a heart attack are five times greater than if you do not.

We have the opportunity at this point in time to exploit this lipid hypothesis for new research in this area which would hopefully, within this decade, lead us to a resolution of this very important problem.

Senator COTTON. Does that conclude your statement?

Dr. COOPER. Yes, Senator Cotton.

SUBMISSION OF QUESTIONS FOR ANSWER IN RECORD

Senator COTTON. Here are some questions prepared by the chairman and staff, most of which have been covered by your statement. Would you take this copy and such questions here as have not been covered in your statement—would you take care of them for the record?

Dr. COOPER. Yes, sir.

(The questions and answers follow:)

Question. In response to questions by the House subcommittee, Dr. Cooper indicated that "there are additional opportunities available for acceleraing progress" against heart and lung disease. Please detail for this Committee those opportunities and the funds required for these opportunities to be pursued? How adequately does this budget request deal with these opportunities?

Answer. Additional opportunities do exist for accelerating research in arteriosclerosis with particular reference to the problem of heart attacks; lung diseases—with particular reference to the problem of emphysema and bronchitis, blood diseases; and the development of medical devices for use in these areas. It is our estimate that from thirty to forty million additional dollars would be needed to undertake programs leading to progress.

In the arteriosclerosis area the Institute established last year a new network of six Lipid Research Clinics at medical institutions in various parts of the country. These clinics will carry out research directed toward the prevention of premature arteriosclerosis—hardening of the arteries—through the identification and treatment of individuals rendered highly susceptible to the disease by abnormalities in blood fats, or blood lipids. We need to find out how many people are subject to abnormalities of fat metabolism—as would be reflected in high levels of their blood cholesterol. We need to find out whether lowering their blood cholesterol by diet or by drugs will in fact protect them against having premature heart attacks. These factors are suspect but not proven.

We hope to establish how these factors act, individually who is mostly likely to have a heart attack and when, so that we can prevent either the attack or death or disability from it. To do this we will need to increase the number of lipid clinics. We also may need to mount a clinical trial wherein several risk factors would be simultaneously controlled. Right now we are awaiting the report of a special task force which has been considering this and other problems related to arteriosclerosis for the last six months. Their recommendations will help us to establish priorities for new programs. Upon the particular recommendations, which type of trial, how many people to be studied and so forth, will depend the cost.

Several new surgical procedures have been developed lately. These include a bypass or short circuit around part of the intestine so that less fat is absorbed into the body. Less fat then appears in the blood, and this may reduce that patient's risk of coronary artery disease. This has not yet been established, but we will look into it.

Some members of our advisory council are assessing the value of by-passing a blocked portion of a coronary artery by surgically inserting a piece of a blood vessel, usually a vein, so that blood can flow through it and around the coronary artery obstruction. Their report is not yet in, although we expect to see it very shortly.

There is a theory that thrombosis, which leads to heart attacks resulting from clots forming in the coronary arteries leading to the heart, can be manifestly reduced by either the prevention of these blood clots or by dissolving clots after their formation. The Institute has just completed a clinical trial using a clot-dissolving substance—urokinase—to dissolve emboli critically located in the lung vasculature. Results from this trial have been most encouraging. The opportunity exists to move ahead with clinical trials using such clot-dissolving products in the coronary arteries to prevent myocardial infarction, or heart attacks. Such trials will require many more patients than the previous pulmonary trial.

Other related blood research that needs acceleration includes the study of methods to separate components of blood for more efficient use of each, and to find ways to improve and make more safe our blood banking and blood transfusion capability. As is known, the supply of human blood for transfusion is always going to be limited. At present blood transfusion not infrequently results in hepatitis. The prospect for controlling the hepatitis associated with blood transfusions is excellent. Tests are currently available that will reduce blood transfusion hepatitis by twenty-five percent. This percentage should increase to close to one hundred percent as better tests and reagents become available. In addition to testing, methods are being developed to remove the hepatitis from blood and blood components by chemical means.

There was begun in 1971 a national network of thirty-four specialized centers of research in arteriosclerosis, hypertension, thrombosis, and pulmonary diseases. At least fifteen additional centers need to be established.

The Medical Device Applications Program has advanced from the former Artificial Heart Program to include research, development, testing, and evaluation of pulmonary as well as heart assist and artificial replacement devices. New materials have been developed that are of particular importance to the program. These materials minimize blood clotting, damage to blood cells, and denaturation of blood proteins; all things which could make the patient worse, not better. These new materials seem to not only work well when made up into heart assist devices, but possess that most critical property, they do not cause major damage to the blood. The next hurdle to be met with these materials is to determine how well they stand up under use and how well the body stands up after having had them implanted. As soon as we have well tested, effective materials we will be ready to evaluate partial or complete artificial hearts for man since we now have energy sources, blood pumps, and control systems in prototype which weigh only four and one half pounds.

Question. You increased lung research funding from $11 million in 1970 to $20 million in 1971. What progress have you seen from this increase, and what funding level for 1972 are you proposing to maintain this progress?

Answer. One of the most important accomplishments during fiscal year 1971 was the establishment of eleven Specialized Centers of Pulmonary Research. These Centers will work closely with the professional staff of the Institute and with each other to accelerate research progress and to develop new and improved diagnostic and therapeutic techniques. The annual level of funding for these Centers is currently $4 million. We have also established, on a much more limited basis, the Pulmonary Academic Award Program. This is designed to improve the teaching of pulmonary diseases to medical students. Its long-range impact, however, will be to recruit talented people into the pulmonary disease area.

Our contract programs have now been expanded into the pulmonary area. We are especially interested in the development of some much-needed devices to assist patients with far advanced pulmonary disease. We are working on these, as well as on studies of O_2 therapy and toxicity for a number of different diseases. However, we are also using the contract mechanism for what we call population studies, which are surveys or examinations of particular segments or groups of people, in an attempt to identify those who are most likely to get diseases of the lung if they are exposed to various substances in the environment, to various injuries of the lung. If we can accurately identify these people then we may be able to prevent the onset of disease, and this is always the best therapy.

The establishment of a clearly identified lung program along with the increased dollar support has allowed us to fund more research into basic problems of lung disease. Already we have seen more applications for such research, and applications of high quality, by virtue of the increased appropriations.

We hope to maintain at least our 1971 pulmonary budget in 1972 so that we may capitalize upon our current program. However, it is clear that there are many new opportunities that we must take advantage of in this area. We will meet these as new resources become available.

Question. If heart disease kills more people annually in the United States than cancer, why aren't we significantly expanding our heart research commitment as we are with cancer?

Answer. It is true that the increases for cancer research were larger than those for heart research both last year and this. However, there were sizeable increases for heart research, $35 million in 1971. The conquest of cancer is a Presidential initiative and it is the President who has requested a $100 million increase for cancer.

Question. Countries such as Denmark and Sweden have markedly less arteriosclerotic heart disease than in the United States. What are you doing to discover the causes of this?

Answer. It is true that Denmark and Sweden have lower heart disease death rates than are found for the same aged men in the United States. For example, in 1967 the death rates from arteriosclerotic heart disease among men aged 45–54 was 134 deaths per 100,000 population in Sweden, 182 deaths per 100,000 in Denmark, and 352 deaths per 100,000 population in the United States.

The National Heart and Lung Institute has not supported any direct studies of this question in Sweden. However, the Institute has supported a comparative epidemiological study between the United States and seven other countries, one of which is the Netherlands. Data from this study did not find the expected low death rate in the town of Zutphen, Netherlands. The rates were consistent with the levels of blood chloesterol found in the Zutphen population. Either the selected town itself was not representative of the Netherlands or there may be a greater amount of heart disease occurring in the Netherlands than is recorded on death data.

Except for countries like Yugoslavia and Israel where P.L. 480 counterpart funds have been available for medical research, the NHLI supports very few studies outside of the United States. The present criteria and requirements for heart research outside the United States would have to be modified if any new studies requiring dollar funds were to be undertaken in Sweden or Denmark.

It is not unlikely that comparable studies undertaken jointly by American and Swedish investigators would shed quite a bit of light on the problem of arteriosclerosis but up to now such studies have not been considered as promising as those that we have engaged in. However the time may have come to revise these opinions and to seek ways of conducting joint studies.

Question. What are the goals and accomplishments of the National Blood Pressure Program? We understand that high blood pressure increases the risk of strokes and heart attacks. What research are you conducting in this area and what are the results?

Answer. The goals of the newly initiated hypertension detection and treatment studies in the general population are to determine the degree to which disability or mortality from hypertension can be reduced by detection and treatment programs.

Nine pilot programs have been started to undertake this cooperative study by scientists in medical centers in the following cities: Salt Lake City, Utah, Washington, D.C., Claxton, Georgia, Baltimore, Maryland, Boston, Massachusetts, Jackson, Mississippi, Los Angeles, California, Birmingham, Alabama, and Chicago, Illinois.

In each of these pilot centers about 300 or more hypertensives will be identified from the community and they will be referred for various programs of medical care for their condition. An effort will be made to evaluate the success of blood pressure treatment programs in such representative hypertensives from each of these communities.

The first phase of this program will last one year and from this experience it will be determined whether to proceed to a full study which would need the participation of more than 6,000 hypertensives to determine whether a reduction of at least twenty-five percent in mortality from strokes and heart attacks can be accomplished through specialized hypertensive treatment programs.

Question. We are hearing more and more about the problem of emphysema which seems to be increasing rapidly. You have no increase proposed over 1971. How do you propose to do any significant work without more funds? How do you propose applications of the results of research? When and how will the public benefit?

Answer. The problems of emphysema and other chronic obstructive lung diseases are indeed increasing rapidly. Within the overall lung area, this will undoubtedly be of highest priority. As I mentioned, eleven newly established Specialized Centers of Research are focusing on lung disease, on basic and clinical studies relevant to emphysema. Within the Institute we now have an Associate Director for Lung Programs whose primary responsibility will be the coordination of the various facets of our lung program. He is responsible for the development and coordination of a coherent program that will include research in our own laboratories, research and development programs financed by contracts, epidemiologic research and a wide variety of fundamental and applied research necessary for clinical progress. Certainly, more needs to be done in the area of clinical applications. We believe, however, that the first and most necessary steps involve a better understanding of lung diseases and the development of new and improved therapeutic approaches. All of this is necessary before we can proceed with the transfer of research information into clinical practice. Certainly this is the ultimate goal of our program.

NEW POSITIONS

Senator Cotton. You only have an increase here of less than $5 million over 1971. Does that just take care of your housekeeping expenses? By that I mean salary increases and others.

Dr. Cooper. This is the pay raise and the annualization. It is not a program increase.

Senator Cotton. How about personnel? Any new positions?

Dr. Cooper. There are 17 new positions in our request.

Senator Cotton. That would come out of this increase?

Dr. Cooper. Yes, sir.

Senator Cotton. So, considering the added expense of the increase—who was it testified about Alice in Wonderland, she had to run twice as hard to stay in the same place—really you have no increase over 1971.

Dr. Cooper. That is correct.

Senator Cotton. More people die of heart disease than cancer, isn't that correct?

Dr. Cooper. Yes, sir.

Senator Cotton. I won't ask you what you asked the Bureau of the Budget for. I have my suspicions, however.

Mr. Miller. Mr. Chairman, I wish you would ask us.

Senator Cotton. All right, I will ask you what did you ask the Bureau of the Budget?

Mr. Miller. Since our request to OMB was based on the House allowance for 1971 our estimated increases for 1972 ended up short of the final 1971 appropriations. OMB in turn increased our request to reflect an increase in 1971 over 1972. In other words, when the final 1971 appropriation was completed, we in a sense, made the budget good and made the 1972 level higher than 1971, which was considerably more than we asked the OMB for originally.

So they really did grant what we requested.

Senator Cotton. This is the only Institute of Health that deals with heart diseases, isn't it?

Dr. Cooper. Basically this is our prime responsibility. Other institutes do fundamental work—General Medical Science, Metabolic Diseases, and so forth. There are other institutes which do basic research in related fields. We take advantage of the results.

Senator Cotton. But it is your responsibility.

Dr. Cooper. It is our responsibility.

Senator Cotton. Now that I have opened the subject, how did the Heart and Lung Institute get left with practically no increase at all?

Dr. Marston. Senator Cotton, with the exception of the $100 million increase for cancer the overall budget in the research area is essentially a level dollar budget, although we do, as I have pointed out, have some areas of emphasis within the figure for research.

Senator Cotton. In other words, this is proportionate to the Institutes with those exceptions?

Dr. Marston. Yes. I think in addition to that, there are ups and downs. This is one of the things that led Dr. Cooper to want to focus especially on the new lung program, because that started off more rapidly last year than he will be able to continue it this year.

Sickle Cell Anemia

There are some increases in his budget for sickle cell anemia, some modest increase in the area of arteriosclerosis. Because the total budget remains the same, it means the increases in those areas are having to be squeezed out of some other areas.

The other point that Mr. Miller made in response to questions from Senator Magnuson is that there was a substantial increase between 1970 and 1971 for this Institute, about $35 million. But we do have some of the problems, speaking in terms of program operation, with this turn-on/turn-off type of thing. It raises particular problems when you are starting out new programs such as the one in the lung area.

Could you add to this?

Senator Cotton. Are the new positions in the lung area?

Dr. Cooper. Some of the new positions, 11 of them, are for the establishment of an initial core of scientists for the establishment of our intramural lung program.

Senator Cotton. Where do we stand on heart transplants?

We don't hear as much about them as we used to.

Dr. Cooper. The current rate of performance of heart transplants around the world is about one a month currently. At the peak in 1968, some 27 or 28 a month were being done, so the activity in this area has been reduced substantially.

The results from what are being done now have a higher percentage of yield and this reflects a greater application of the newer information in immunology, better organ preservation, and the greater importance being attached to the problem of selection of the patient ahead of time.

Senator Cotton. It has not been going long enough so that you can say anyone has lived very long with a transplant.

Dr. Cooper. The longest that continues to live at this point in time is now about 3 years.

Senator Cotton. Thank you, Doctor.

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF DENTAL RESEARCH

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF DENTAL RESEARCH

For expenses, not otherwise provided for, to carry out title IV, part C, of the Public Health Service Act, [$35,257,000] *$38,829,000.*

Amounts Available for Obligation

	1971	1972
Appropriation..........................	$35,257,000	$38,829,000
Real transfer to:		
"Departmental management"...........	-10,000	---
Real transfer from: "National Institute of General Medical Sciences" (Proposed transfer for increased pay costs).	+183,000	---
Comparative transfers to:		
"Office of the Director"...........	-31,000	---
"National Library of Medicine"......	-112,000	---
"Health Manpower"..................	-985,000	---
Comparative transfer from:		
"Health Manpower"..................	+401,000	---
Total obligations...........	34,703,000	38,829,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
115	Research..................		$16,962,000		$18,886,000		+$1,924,000
	General research support grants..........		(1,028,000)		(908,000)		(-120,000)
	Categorical clinical research center.........		(380,000)		(380,000)		(---)
	Dental research institutes..............		(4,700,000)		(6,200,000)		(+1,500,000)
123	Fellowships...............		1,601,000		1,367,000		-234,000
125	Training..................		4,285,000		4,285,000		---
	Direct operations:						
127	Laboratory and clinical research.................	216	5,937,000	219	6,547,000	+3	+610,000
130	Collaborative research and development..........	9	3,877,000	11	5,408,000	+2	+1,531,000
132	Biometry, epidemiology and field studies........	23	747,000	26	938,000	+3	+191,000
133	Review and approval of grants................	33	852,000	33	929,000	--	+77,000
134	Program direction.........	23	442,000	23	469,000	--	+27,000
	Total obligations.....	304	34,703,000	312	38,829,000	+8	+4,126,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions............	304	312	+8
Full-time equivalent of all other positions....	16	16	--
Average number of all employees................	310	319	+9
Personnel compensation:			
Permanent positions..........................	$4,324,000	$4,775,000	+$451,000
Positions other than permanent..............	131,000	155,000	+24,000
Other personnel compensation................	56,000	60,000	+4,000
Total personnel compensation..............	4,511,000	4,990,000	+479,000
Personnel benefits............................	513,000	554,000	+41,000
Travel and transportation of persons...........	178,000	233,000	+55,000
Transportation of things......................	46,000	54,000	+8,000
Rent, communications & utilities..............	120,000	156,000	+36,000
Printing and reproduction.....................	67,000	76,000	+9,000
Other services:			
Project contracts...........................	3,360,000	4,760,000	+1,400,000
NIH management fund.........................	1,751,000	1,909,000	+158,000
Other.......................................	626,000	687,000	+61,000
Supplies and materials........................	490,000	568,000	+78,000
Equipment.....................................	196,000	307,000	+111,000
Grants, subsidies & contributions..............	22,848,000	24,538,000	+1,690,000
Deduct quarters and subsistence charges.......	-3,000	-3,000	---
Total obligations by object............	34,703,000	38,829,000	+4,126,000

Summary of Changes

1971 estimated obligations	$34,703,000
1972 estimated obligations	38,829,000
Net change	+4,126,000

	Base		Changes from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase cost	---	---	---	+$196,000
2. Annualization of positions new in 1971	---	---	---	+54,000
3. Within grade increases	---	---	---	+138,000
4. FTS rate increase	---	---	---	+12,000
5. Extra day of pay	---	---	---	+13,000
B. Program:				
1. Research grants	---	16,962,000	---	+2,188,000
2. Laboratory and clinical research	216	4,491,000	+3	+250,000
3. Collaborative research and development	9	3,849,000	+2	+1,500,000
4. Biometry, epidemiology and field studies	23	678,000	+3	+150,000
C. Payment to "National Institutes of Health management fund" for centrally furnished services	---	1,706,000	---	+158,000
Total, increases	---	---	+8	+4,659,000
Decreases:				
A. Built-in:				
1. Research grants	---	16,962,000	---	-144,000
B. Program:				
1. Research grants	---	16,962,000	---	-120,000
2. Fellowships	---	1,601,000	---	-234,000
3. Laboratory and clinical research	---	4,491,000	---	-35,000
Total, decreases	---	---	---	-533,000
Total, net change	---	---	+8	+4,126,000

Explanation of Changes

Built-in increases--These increases will provide $196,000 for annualization of 1971 pay increase; $54,000 for annualization of new positions in 1971; $138,000 for within grade increases effective in 1971; $12,000 for increased costs in 1972 of using the Federal Telecommunications System; and $13,000 for extra day of pay in 1972.

Research grants--The increase of $2,188,000 includes $688,000 for competing grants in the regular program and $1,500,000 for continuation requirements in the Dental Research Institute program. The request also includes a decrease of $264,000 of which $120,000 is in general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources, and a built-in decrease of $144,000 in noncompeting requirements in the regular program.

Fellowships--The decrease of $234,000 represents a reduction of 10 fellowship awards in the regular program to a 1972 level of 82 awards.

Laboratory and clinical research--The increase of $250,000 and 3 positions will allow for expansion of research in dental caries under the National Caries Program. The increase is offset by a decrease of $35,000 in non-initiative programs. There is also a program increase of $78,000 in the NIH management fund for centrally furnished services.

Collaborative research and development--The increase of $1,500,000 and 2 positions will provide funds to support contracts related to the cause and prevention of dental caries under direction of the National Caries program.

Biometry, epidemiology and field studies--The increase of $150,000 and 3 positions will allow for expansion of field studies related to research under the National Caries Program.

Significant Items in House and Senate Appropriation Committee Reports

Item	Action Taken or to be Taken
1971 House Report	
1. Committee urges the Institute to consider how greater emphasis might be applied to research in Periodontal disease. (Page 21)	1. Basic research has produced a body of knowledge which can be further developed with the expectation that by 1980, means will have been found for making dental caries almost completely preventable. Unfortunately a similar body of knowledge does not yet exist on periodontal disease. The Institute will continue to pursue basic research in this area in the hope that promising leads for prevention and control of periodontal disease may be found.
2. Committee hopes that the Institute will give greater emphasis to research on causative factors with the ultimate goal of preventing cleft lip and cleft palate. (Page 21)	2. The Institute will give high priority to research grant applications and other research efforts which focus on the genetic and environmental causes of cleft lip and cleft palate.
3. Committee asks the Director of the Dental Research Institute to submit a realistic plan for the optimum development of the Nation's dental research effort during the next five years. (Page 21)	3. Based on his professional judgement and the advice of the National Advisory Dental Research Council, the Director has submitted a 5-year plan for the optimum development of the Nation's dental research effort.

1971 Senate Report	
1. The Director of the Dental Research Institute should submit a realistic plan, based on his professional judgement and the advice of the Institute's Advisory Council, for the optimum development of the Nation's dental research effort during the next five years. (Page 38)	1. Based on his professional judgement and the advice of the National Advisory Dental Research Council, the Director has submitted a 5-year plan for the optimum development of the Nation's dental research effort.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act		
Section 301--Research and Investigation, in general	Indefinite	$38,829,000
Title IV, Part C--National Institute of Dental Research	Indefinite	$38,829,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in section 301 of the Public Health Service Act.

The Public Health Service Act, Title IV, National Research Institutes, Part C, National Institute of Dental Research--

"Section 421. There is hereby established in the Public Health Service a National Institute of Dental Research (hereafter in this part referred to as the 'Institute').

"Section 422. In carrying out the purposes of section 301 with respect to dental diseases and conditions the Surgeon General, through the Institute and in cooperation with the National Advisory Dental Research Council (hereafter in this part referred to as the 'Council'), shall--

(a) conduct, assist and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of dental diseases and conditions;

....

(c) provide fellowships in the Institute from funds appropriated or donated for the purpose;

....

(f) provide training and instruction and establish and maintain traineeships, in the Institute and elsewhere in matters relating to the diagnosis, prevention, and treatment of dental diseases and conditions with such stipends and allowances (including travel and subsistence expenses) for trainees as he may deem necessary, the number of persons receiving such training and instruction, and the number of persons holding such traineeships, to be fixed by the Council, and, in addition, provide for such training, instruction and traineeships through grants, upon recommendation of the Council, to public and other non-profit institutions."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental management	-$10,000	To establish the Facilities Engineering and Construction Agency.
Real transfer from:		
National Institute of General Medical Sciences	+183,000	Proposed transfer for increased pay raise costs.
Comparative transfer to:		
Health Manpower	-985,000	Transfer of institutional support funds to Health Manpower.
Office of the Director	-31,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director.
National Library of Medicine	-112,000	To provide an equitable distribution of the Management Fund in 1972.
Comparative transfer from:		
Health Manpower	+401,000	Transfer of research and training grants from Dental Health.

National Institute of Dental Research

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$13,933,000	$14,681,000	$20,000,000	$17,340,000
1963	17,199,000	19,199,000	22,199,000	21,199,000
1964	19,809,000	19,689,000	19,809,000	19,689,000
1965	20,209,000	20,090,000	20,190,000	20,190,000
1966	22,177,000	22,177,000	23,677,000	23,677,000
1967	24,884,000	28,308,000	28,308,000	28,308,000
1968	30,307,000	30,307,000	32,307,000	30,307,000
1969	30,414,000	29,553,000	30,414,000	29,983,500
1970	29,289,000	29,289,000	32,000,000	30,808,831
1971	34,563,000	35,257,000	36,257,000	35,257,000
1972	38,829,000			

National Institute of Dental Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	304	$5,024,000	312	$5,544,000	+8	+$520,000
Other expenses...........	---	29,679,000	---	33,285,000	--	+3,606,000
Total..................	304	34,703,000	312	38,829,000	+8	+4,126,000

General Statement

The National Institute of Dental Research conducts and supports basic, clinical, and applied research and research training, in the causes, diagnosis, prevention, and cure of oral diseases and disorders: (1) intramural laboratory, clinical and field research is conducted, (2) dental and medically-related research and research training is supported by assisting individuals, universities, institutions, and agencies through grants-in-aid for research projects, training, fellowships, and dental research institutes, (3) collaborative and developmental research programs aimed at specific dental problems are conducted and supported, and (4) dissemination of research findings and related information is supported. The improvement in oral health of all individuals through the greater understanding of the biological phenomena underlying oral diseases and disorders, and the advancement of capability for the diagnosis, treatment, and prevention of oral disease constitute the long-range objectives of the Dental Institute.

Tooth decay ranks equally with impaired eyesight and defective hearing as widespread health problems. This major health problem spares only two per cent of our total population, occupies over half of the average dentist's time and afflicts 50 per cent of our children under two. The dentist's chair alone cannot provide the solution to this problem.

Development of a scientific base of knowledge which will permit significant advances against dental caries has paralleled somewhat the upsurge in demand for health care. Prospects are promising for success of an accelerated and concerted attack against this disease. Dental caries may be almost completely preventable within the next decade by exploiting this base of knowledge by a vigorous research effort. An increase of $2,900,000 is included in these estimates for further expansion of the National Caries Program to enable the Institute to accelerate the development and application of knowledge in anticipation of eradicating tooth decay.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research projects....................	$10,854,000	$11,398,000	+$544,000
Special programs....................	5,108,000	7,488,000	+1,380,000
Total research grants.........	16,962,000	18,886,000	+1,924,000

Introduction

Research grants are used to support a broad range of scientific investigations encompassing both basic and clinical studies. These projects, ranging from highly focused studies to multidisciplinary programs, have the ultimate goal of yielding new treatment techniques and preventing the various dental diseases and conditions which affect nearly everyone in the course of a lifetime. Research grants support scientists or groups of scientists at universities, dental and other colleges, hospitals, research institutions, and other nonprofit institutions.

The Extramural Programs have been restructured recently into six major areas more representative of clearly delineated programmatic goals. These categorical areas are:

Dentitional Diseases Program
Periodontal Diseases Program
Developmental Biology and Oral-Facial Anomalies Program
Biomaterials Program
Soft Tissue Stomatology Program
General Oral Sciences Program

As a new mechanism of research support, the National Institute of Dental Research initiated in FY 1971 a Special Dental Research Award Program to stimulate and help newly-trained investigators remain active in dental research. These investigators represent a vital resource for maintaining an adequate science base in the field of oral health. A number of these small grants are included in the research grants distribution tables under the item listed as competing projects.

Program Plans for 1971 and 1972

Dentitional Diseases Program

This program, formerly the Dental Caries and Hard Tissues Program, places major emphasis on dental caries but also encompasses research on tooth abrasion, tooth erosion, and research on the properties and composition of teeth.

Dental caries is a complex disease involving an interrelationship between the host, diet, and microorganisms. Scientific evidence indicates that the lesion or cavity results after bacteria ferment carbohydrates, producing acid which dissolves the enamel.

To make the most effective use of available research grant funds, investigators, in 1972, will be encouraged to undertake research which offers the best hope of developing an easily-applied and inexpensive caries prevention method. Investigators will be particularly encouraged to develop and test new antibiotics and new antibacterial agents which will either specifically prevent the growth of cariogenic organisms or suppress the formation of plaque. Encouragement will also be given for new research proposals designed to develop and test sealants to protect the tooth surface from the acids produced by organisms in the mouth.

Search will also continue for a better understanding of the role of salivary factors in dental caries, and of natural dietary factors in the development of caries-resistance and susceptibility. Research on the mechanisms of fluoride action will also continue with the anticipation that the knowledge gained can be used to establish rapid laboratory methods for screening other potential anti-caries agents.

Periodontal Diseases Program

Periodontal disease is the oral condition which affects the gums and other supporting tissues which hold the teeth in place. Since this disease is the main cause of tooth loss in adults past thirty-five years of age, it represents a major health problem in the nation and world. Currently, two out of every three Americans over 40 years of age suffer from this insidious disease. Moreover, it is estimated that more than 25 million persons are in critical need of periodontal treatment. Without treatment, periodontal disease attacks relentlessly and causes progressive infection, inflammation, and loss of teeth. With the increasing life span of the average citizen, more and more people have periodontal disease. Thus, it is imperative that research on the disease process be expanded, so that rational programs of control and prevention can be developed.

Ongoing studies on the nature of periodontal disease are continuing to examine various phenomena which seem to be involved in the pathologic sequence. In exploring the questions of which bacteria cause the disease and what the disease mechanisms are, both germ-free rats and experimental human subjects are being studied in highly controlled situations. The human studies have indicated that Gram-negative bacteria alone can cause gum inflammation, the first stage of periodontal disease. In germ-free rat studies, pure cultures of certain oral organisms isolated from humans have caused periodontal disease whereas other human and animal organisms did not. Further study in humans and germ-free rats during the coming year is expected to produce information that will clarify these findings.

It is believed that the earliest changes in periodontal disease are brought about by bacterial substances which directly damage the surface epithelium. Such injury allows bacterial endotoxins, antigens, enzymes, chemotactic agents, and yet unknown toxins to penetrate more easily into the periodontal tissues and set off a chain of host inflammatory events which are primarily immunological in nature. In the coming year research will concentrate heavily on continued studies of the inflammatory process and the role of the immune system. Specific substances involved in immunologic inflammation will be searched for and measured in the diseased tissues themselves. Studies will be made of how these substances are related to structure-destroying host enzymes. Approaches will also be made to discover how certain white cells of the body's infection-fighting system, such as neutrophils and lymphocytes, may participate in disease. With increased emphasis in research on molecular mediators of inflammation it may be possible to eventually develop and use specific inhibitors and anti-inflammatory agents in treatment of the disease.

Expansion of studies to understand and control the factors responsible for the degradation of connective tissue and bone have been marked for immediate emphasis during the next year. Plans are being made to develop a multi-disciplinary approach to the response of connective tissue to inflammation with particular attention to those factors contolling the production of collagenase and other enzymes which degrade connective tissues, and bring about loss of supporting bone.

Developmental Biology and Oral-Facial Anomalies Program

The Developmental Biology and Oral-Facial Anomalies Program (formerly the Oral-Facial Growth and Development Program) supports research on hereditary and environmental factors which cause oral-facial malformations. It is hoped that these investigations will lead to effective and feasible preventive measures. This program area also seeks to increase research efforts directed toward improved treatment for both esthetic and functional deficiences.

Groups of consultants have been convened over the past few years for the purpose of ascertaining the "state of the art" in these problem areas. These scientific assessments have been useful and effective in program planning.

Developmental Biology

Research in developmental biology--in embryology and genetics, for example--will continue to be supported so that more knowledge can be gained about the development, growth, and eruption of teeth. These biological processes have a bearing not only on malocclusion, but on many other oral disabilities. Thus, investigations supportive to the broad area of oral-facial growth and development will continue to be funded. Included are studies of normal and abnormal growth, development, and function of the oral-facial complex.

Cleft Lip/Palate

The support of two research areas which are highly pertinent to the rehabilitation of an individual afflicted with cleft lip/cleft palate will continue to be highlighted. Whether a clefted person can speak clearly or whether this speech is nasal and hard-to-understand depends in large part on the effectiveness of surgery to close the cleft. Assessment of surgical techniques will thus continue to receive attention. Also, long-term, follow-up studies on late adolescents and young adults will be pursued to determine the nature and magnitude of psychosocial problems associated with lip and palatal defects.

With emphasis on prevention, studies to better identify and understand environmental and genetic factors which predispose the child to develop cleft lip/cleft palate will be strongly encouraged.

Malocclusion

Severe malalignment of teeth and underdeveloped or overdeveloped jaws affect the child at an early age. These disfiguring conditions threaten the mental health of the individual as well as affecting speech and other vital functions of the mouth and dentition. In the next year, epidemiological studies will be supported in order to assess both prevalence and severity. In addition, longitudinal studies of oral-facial growth and development will be continued because the knowledge to be gained should help orthodontists better predict growth and thereby make for more simplified treatment methods.

Biomaterials Program

The objective of this program is to increase the availability and efficacy of dental care by fostering the development of new and improved materials and methods of treatment. Under this mission, support is provided to both basic and applied research projects which involve a multitude of physical and biological disciplines.

Since the specialized tissues of the mouth cannot replace themselves when they are lost, repairing the damage from dental diseases relies largely on the effective use of restorative materials.

The most conspicuous research progress made in this program area and perhaps in the whole arena of dental research has been the continued success of studies in which the biting surfaces of teeth have been protected against decay for two years by a coating of plastic. This study has progressed sufficiently well to warrant large-scale field trials involving hundreds of human subjects. Several such studies are already underway. It is fully expected that expanded use of the preventive measures developed in this project will have a strong impact in reducing the number of teeth lost from decay throughout the world.

More effective and efficient dental adhesives, either for sealing the biting surfaces against decay or for sealing the margins of fillings, are being sought continuously from various sources. In one approach, studies are being made of sea animals that produce compounds which stick under water. This year two contracts to explore the adhesive mechanisms of seven or more marine animals were initiated. In order to fully examine the feasibility of this promising idea, it is planned to expand and continue these efforts for at least the next two years.

While artificial dental implants made of plastic have received investigative attention in animals for nine years and are now about to be assayed in humans, dental implants of metal and ceramic have not been adequately studied. This year widespread research interest has been expressed in the possibilities of titanium and calcium aluminate ceramic implants of defined porosity. It is anticipated that several promising projects will get underway this year.

Soft Tissue Stomatology Program

Oral Ulcerations

Diseases of the oral soft tissues affect 20 percent of the population at any given time, and about 70 percent of these individuals experience recurring episodes. These diseases create significant problems for approximately four million Americans. Symptoms range from severe pain, in the case of acute ulcerative conditions, to possible death in newborn infants and children. With one exception, the causes of ulcerative disorders of the oral soft tissues are unknown. The exception is primary and recurrent herpes simplex, one of the most common virus infections of man. Thirty percent of the young adult population in the United States suffer from recurrent attacks which are characterized by swollen lips, itching, burning, pain, and possible disfigurement. More severe cases are accompanied by fever, fatigue, and emotional trauma. In addition, these individuals have difficulty in eating and speaking. While the oral cavity is the primary site for herpes simplex virus infections, there is mounting evidence that this virus is also the causative agent of (1) infections of the eyes (repeated attacks are known to produce blindness); (2) non-epidemic viral encephalitis (often resulting in death); and (3) viral-induced skin disease. More recently, this virus has been implicated as a life-threatening factor in patients on a regimen of immunosuppressive drugs employed in the treatment of systemic disorders and organ transplants. There is speculation that the virus also may play a role in carcinoma of the cervix. Finally, the Epstein-Barr (EB) virus, which resembles herpes simplex virus, may be the etiologic agent for infectious mononucleosis and Burkett's lymphoma, a neoplastic condition of the jaw.

Support of research on the pathology, etiology, epidemiology and prevention of oral soft tissue lesions is of major concern to the National Institute of Dental Research. Therefore, the Institute will continue to encourage research programs and collaborative studies leading to the cure, and most importantly, the prevention of recurrent herpetic disorders.

Oral Cancer

It is estimated that in 1970 there will be over 15,000 new cases and 6,800 deaths from cancer of the oral cavity and pharynx. Oropharyngeal cancer is not one of the major causes of death but there are few, if any, diseases which cause greater disfigurement. People who die from this disease, about half of all patients, experience a lingering and painful death.

If cancer is not detected early and is allowed to grow to a large size (one inch in diameter) before it is treated, a surviving patient may have to face life with only half a tongue, part of a jaw, part of a face and in many cases, devoid of a larynx (voice box). These patients have a major problem in readjustment, as do their families and business associates. To rehabilitate such a person and make his appearance acceptable often requires long periods of expensive plastic surgery or costly maxillo-facial prosthetic devices which need constant attention and frequent replacement.

On the other hand, if oral cancers are diagnosed and treated early, over 90 percent can be arrested by simple, local removal of the cancerous growth. In most patients who undergo early treatment for cancer, there is no mutilation and the surgery performed does not interfere with normal speech and eating. A major problem in early diagnosis is the 18-20 percent of all adults who have, within the mouth, a wide variety of benign (non-cancerous) lesions, only a small portion of which ever develop into cancer.

The National Institute of Dental Research will support program efforts to:

1) develop new and inexpensive screening techniques to identify individuals who may have precancerous areas in their mouths, and
2) continue studies concerned with changes occurring in premalignant and malignant oral tissues (leukoplakia, leukoedema, and erythroplasia).

Salivary Gland Disorders and Saliva

Millions of microorganisms, including pathogenic viruses and bacteria, are constantly entering the human body through the mouth. Ordinarily, these organisms would produce local and systemic deseases were it not for the protective influence of the oral secretions. When the salivary glands do not function properly, the body's resistance to infection is lowered. Research programs into the nature, structure and function of the major salivary glands and their secretory products are being actively supported.

Saliva is one of the body fluids which contains an antibody called immunoglobulin A (igA). This substance has recently been identified as one of the biological agents which has the capacity of rendering viruses and bacteria incapable of inducing pathogenic infection. Paradoxically, IgA is also implicated in autoimmune and hypersensitivity reactions which may precipitate pathologic conditions such as aphthous stomatitis and Behcet's disease in humans. Studies on the mechanisms of IgA synthesis in and secretion from salivary gland cells will provide information essential to the major program proposed for the control and prevention of oral ulcerative conditions attributable to herpes simplex virus.

Emphasis will continue to be placed on studies to elucidate the role of the autonomic nervous system in salivary functions. This information will provide a baseline for clinical diagnosis and treatment of a wide range of salivary dysfunctions such as hypotyalism seen in the aged.

One of the more recent and more important areas of salivary gland research involves non-cancerous lesions and diseases which appear as enlargement of the salivary gland. Although these diseases are common, their etiologies are largely unknown. It is planned to support a limited number of grants to define the pathogenesis of these problems.

Dental Pulp Studies

The dental pulp offers an experimental model of value in studying the effects of various stimuli (physiological, neurohumoral and pharmacological) on circulation and the effects of changes in circulation on the repair of dental structures. Support of programs in this area along with basic scientific studies of blood vascular dynamics of the pulp chamber and neurohumoral aspects of the pulp will continue at a modest level. A limited number of training programs in endodontic research will also be supported.

General Oral Sciences Program

This program area was newly established by the Institute during the latter portion of FY 1970 to bring together those extramural research activities that either lacked clear relevance to a particular disease-oriented program area or had significance for more than one of the disease-oriented program areas. It encompasses those basic biological and behavorial sciences of greatest relevance to our understanding of oral and dental diseases.

Pain Control and Anesthesiology

Because of the centrality and critical importance of the problem of pain to dentistry, broad investigations of etiology and control, including anesthesiology, have high program priority. A particular research gap is the need to gain a better understanding of the cardiovascular effects of widely used dental anesthetic agents on ambulatory dental patients. Such patients leave the dental office within an hour after surgery and expect to resume their normal activities at least by the next day. Most of the previous work in this field has been devoted to hospitalized patients, and evidence exists to suggest that the effects on ambulatory patients may be quite different. Accordingly, continuing efforts will be made to further develop this important field.

In the related area of local anesthesia, the effects of various local and systemic factors that may influence the duration of intraoral anesthesia produced by various agents are being investigated.

Other General Oral Biology Studies

A basic project of potentially great significance being supported involves the study of the regulation of blood flow in the gingival microcirculation. This work could shed new light on the role of the host in the etiology of periodontal disease.

Dental Research Institutes

Five institutes or centers are being supported in 1971. Their research programs are continuing to be developed and expanded into new areas. The number of collaborative programs is increasing, not only to utilize appropriate strengths existing in surrounding institutions, but to make the resources of the institutes available to these institutions. The centers are beginning to have a strong impact on dental education in dental schools associated with them. Highly qualified teachers, who would not otherwise be available to the dental schools, are helping to produce curriculum changes resulting in increased awareness and understanding of the importance of research to high quality dental health care.

While the institutes are increasingly playing an important role as regional centers, the need for a larger function is becoming apparent. In an area which has been historically deficient in research, as contrasted with medicine, and which is characterized by care problems of grave magnitude, these institutes must serve as national resources. They have clearly demonstrated their potential for assuming this responsibility.

Each institute is individualistic and is addressing its program to different aspects of the total oral health problem. One institute, for example, is concerned with in-depth studies of the cranio-facial region, from which hopefully will emerge new insights leading to new diagnostic, therapeutic, and preventive approaches to a great array of problems of growth and development.

In 1972, four of the institutes will be moving into their second five-year periods of support, while the fifth will be in its third year of development. Additional funds will be used to further expand and strengthen these five programs. Emphasis will be placed on building strong clinical research components related to the basic research programs of the centers. It is essential to correlate the accumulation of basic and clinical knowledge to provide a more rapid benefit to the public through improved oral health care.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting continuations........	134	$8,158,000	126	$8,014,000	-8	-$144,000
2. Competing projects.....	49	2,571,000	76	3,259,000	+27	+688,000
3. Supplementals..........	(8)	125,000	(1)	125,000	(-7)	---
4. Subtotal regular program..............	183	10,854,000	202	11,398,000	+19	+544,000
5. General research support.............	---	1,028,000	---	908,000	---	-120,000
6. Categorical clinical research centers.....	1	380,000	1	380,000	---	---
7. Dental Research Institutes...........	5	4,700,000	5	6,200,000	---	+1,500,000
8. Total research grants..............	189	16,962,000	208	18,886,000	+19	+1,924,000

Research Grants Program Analysis

	1970 Actual	1971 Estimate	1972 Estimate	Increase or Decrease
Dentitional Diseases Program..	$3,116,000	$3,915,000	$4,354,000	+$439,000
Periodontal Diseases Program..	1,323,000	1,357,000	1,357,000	---
Developmental Biology and Oral-Facial Anomalies Program....................	2,455,000	2,525,000	2,525,000	---
Biomaterials Program..........	1,201,000	1,525,000	1,630,000	+105,000
Soft Tissue Stomatology Program....................	997,000	1,022,000	1,022,000	---
Oral Neoplasia...............	105,000	89,000	89,000	---
General Oral Sciences Program....................	421,000	421,000	421,000	---
Subtotal regular program............	9,618,000	10,854,000	11,398,000	+544,000
General research support grants.....................	1,119,000	1,028,000	908,000	-120,000
Scientific evaluation grant...	42,000	---	---	---
Categorical clinical research centers....................	337,000	380,000	380,000	---
Dental Research Institutes....	3,400,000	4,700,000	6,200,000	+1,500,000
Total research grants.........	14,516,000	16,962,000	18,886,000	+1,924,000

- - - - -

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total fellowships..................	$1,601,000	$1,367,000	-234,000

Program Plans for 1971 and 1972

The shortage of trained clinical investigators, well-grounded in research methodology and able to engage in new and imaginative programs to solve oral health problems, is of paramount concern. The funds available for fellowships will therefore be used largely to train clinical investigators. Postdoctoral and special fellowships, as well as research career development awards, will be used for this purpose.

Fellowship Program Analysis

Fields	1970 Actual	1971 Estimate	1972 Estimate	Increase or Decrease
1. Dentitional Diseases Program....	$234,000	$244,000	$204,000	-$40,000
2. Periodontal Diseases Program....	243,000	255,000	215,000	-40,000
3. Developmental Biology and Oral-Facial Anomalies Program........................	381,000	398,000	358,000	-40,000
4. Biomaterials Program............	119,000	125,000	75,000	-50,000
5. Soft Tissue Stomatology Program........................	378,000	396,000	356,000	-40,000
6. General Oral Sciences Program......................	174,000	183,000	159,000	-24,000
Total........................	1,529,000	1,601,000	1,367,000	-234,000

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting...........	58	$1,033,000	57	$1,054,000	-1	+$21,000
b. Competing..............	3	35,000	3	37,000	-	+ 2,000
2. Supplementals..............	(5)	5,000	(5)	6,000	-	+ 1,000
3. New awards.................	36	528,000	22	270,000	-14	-258,000
Total fellowships........	97	1,601,000	82	1,367,000	-15	-234,000

Fellowships (By Type of Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Predoctoral..............	5	$28,000	2	$11,000	-3	-$17,000
2. Postdoctoral.............	29	251,000	27	241,000	-2	-10,000
3. Special..................	26	369,000	24	368,000	-2	- 1,000
4. Development awards........	33	831,000	25	625,000	-8	-206,000
5. Career awards............	4	122,000	4	122,000	-	---
Total fellowships.......	97	1,601,000	82	1,367,000	-15	-234,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total training grants............	$4,285,000	$4,285,000	---

Program Plans for 1971 and 1972

The training programs of the National Institute of Dental Research have had a singular impact upon dental education and research in this country. By adding to the sparse supply of trained dental school faculty, they have contributed to the better preparation of a greater number of students for professional practice. They have also made it possible for scientists from various disciplines to contribute their talents to the solution of complex oral problems of overwhelming dimensions.

As public demand for dental care increases, the need for dental research training becomes even more compelling. In particular, there is a critical lack of competent clinical investigators, with strong backgrounds in the sciences and in-depth training in the clinical specialties, to develop new preventive and control measures that will diminish the need for care. The first trainees of two combined PhD-DDS training programs, begun in 1964 and 1965, are now being graduated, but their number is necessarily limited.

NIDR will seek to expand its efforts to produce competent clinical investigators. A major step in this direction was taken during Fiscal Year 1970, when a new training center was established in a large university-hospital consortium.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting..........	83	$3,817,000	65	$3,353,000	-18	-$464,000
b. Competing............	2	78,000	12	474,000	+10	+396,000
2. Supplementals...........	(16)	350,000	(13)	300,000	(-3)	-50,000
3. New grants...............	--	---	4	118,000	+4	+118,000
4. Scientific evaluation....	(1)	40,000	(1)	40,000	--	---
Total training grants.	85	4,285,000	81	4,285,000	-4	---

Training Grants (By Type of Programs)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Graduate Training Grants:						
1. Basic sciences..........	67	$3,353,000	63	$3,320,000	-4	-$33,000
2. Clinical sciences.......	18	892,000	18	925,000	--	+33,000
3. Scientific evaluation...	(1)	40,000	(1)	40,000	--	---
Total training grants.	85	4,285,000	81	4,285,000	-4	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	216	$3,496,000	219	$3,799,000	+3	+$303,000
Other expenses............	---	2,441,000	---	2,748,000	--	+307,000
Total...................	216	5,937,000	219	6,547,000	+3	+610,000

Introduction

As in previous years, the public health mission of the intramural research program continues to be that of developing new information regarding the cause of a variety of oro-facial malfunctions, including dental caries, periodontal disease, oral cancer and abnormal oro-facial developments. Clearly, the ultimate aim is to achieve new and more effective means of treatment and/or prevention of these physically and economically debilitating conditions.

The causation of each of the abnormal states listed above is most certainly attributable to multiple factors, about which all too little is known. In most, the factors involved have not yet been defined adequately enough to yield promise of immediate evolution into preventive measures. As a consequence, the intramural research approach involves a tripartate commitment of its resources to basic laboratory investigations; to clinical and applied investigations relating to the solution of specific questions which stem from progress made at the basic level; and to epidemiologic and field studies directed toward: (1) clinical trials of newer therapeutic or preventive concepts, which have evolved from basic and applied studies; or (2) further definition of the nature and distribution of oro-facial disease on an epidemiologic or geographic basis.

With specific regard to dental caries, however, this systematic research approach has, over the past 20 years, led to the aquisition of a substantial body of knowledge concerning the etiology and pathogenesis of the disease. Largely on the basis of this accumulated information, a more directed effort toward the eradication of caries as a public health problem has now been undertaken. In 1968 the Dental Institute initiated a National Caries Program, guided by a Caries Task Force, involving all relevant scientific competencies within the total Institute. This program has the highest priority in the utilization of intramural manpower and resources.

Program Plans for 1971 and 1972

Intramural Contribution to NIDR's National Caries Program

The expanded intramural effort in dental caries, now an integral aspect of the Institute's National Caries Program, is directed toward the attainment of a more thorough understanding of oral bacteria; specifically, those strains of oral streptococci which appear to be integrally involved in the etiology of caries. These organisms are characterized by their ability to adhere tenaciously to the enamel surface, as a component of dental plaque; by preferential utilization of dietary sucrose for their growth and metabolism; and, most significantly, by their propensity for producing large amounts of acid as a consequence of sucrose metabolism. It is the latter property, coupled with the close enviornmental relationship to the tooth surface, which presumably renders these organisms highly cariogenic. Their cariogenicity has been amply demonstrated in animal experiments. Indeed, organisms of similar properties have been isolated from human caries lesions and shown to produce caries when implanted in the mouth of test animals, including monkeys.

Recognizing that specific organisms may be the key to dental caries, research is being focused on areas which will serve to define more precisely their absolute role in the caries process, to determine the efficacy of local treatment by antibiotic or by related bactericidal agents; and to test new biological approaches aimed at altering the metabolism of the organisms so as to render them harmless. With regard to the latter approach, institute scientists are now much involved in experiments relating to the possible efficacy of a specific enzyme dextranase, whose chief effect would be that of preventing the adherence of streptococci to the tooth surface, thereby breaking the vicious circle of events which seems so essential to their role in the genesis of decay.

Topical application of fluoride in fitted vinyl mouthpieces, undertaken in the school enviornment with appropriate professional supervision, has already been shown to exert striking benefits to children of primary school age in areas where water fluoridation is not practicable. These long-term studies are being further expanded to determine whether the benefits of topical application in mouthpieces augment those already extant in areas where community water supplies are fluoridated. Another program of considerable promise is related to an assessment of the long-term benefits which the topical mouthpiece method may provide to preschool children who have not yet developed their adult dentition.

In the absence of complete public acceptance of water fluoridation as a public health measure and in view of economic and logistical factors which militate against achieving total effectiveness for this mode of delivery in any case, intramural research efforts to develop alternative methods of protection which might supplement or some day even supplant water fluoridation are continuing. For the coming year particular emphasis will be directed toward the study of nutritional supplements, including trace elements and phosphate compounds with specific regard to determining the basis for their apparent anti-caries activity in animals and the degree to which this action may be extended to the human situation.

A question of fundamental importance to the Caries Program is now receiving concerted attention by intramural scientists. This relates to the development of valid diagnostic criteria for dental decay; criteria which can be applied prior to the time that frank decay occurs. Virtually all clinical trials relating to the testing of new therapeutic measures for decay prevention currently depend upon analysis of full-blown lesions in the tooth, which have progressed beyond the point of reversibility. Since the decay process is a relatively slow one, and since significant amounts of dental caries must be present in order to derive accurate statistical inferences, trials of this sort currently require a minimum period of two years. Accordingly, it is of both practical and ethical importance to establish standards which can be applied long before the irreversible stage of decay has been reached.

Periodontal Disease

With the growing concern regarding the role of dental plaque in the etiology of dental caries has developed an increasingly attractive hypothesis that similar adherent masses of bacteria, food debris and gummy materials which comprise the plaque may, over a period of some years, be instrumental in initiating gingival inflammation, and ultimately, periodontitis. Research results have already indicated quite clearly that the organism or organisms involved in periodontal disease do not resemble the streptocci which are now being scrutinized with respect to caries. On the other hand, a specific filamentous microorganism, previously isolated from human diseased gums, has how been shown in experimental animals to elicit a disease state closely resembling periodontal disease. It shares with cariogenic streptococci the capacity for producing large amounts of gummy extracellular material which, as in the case of the streptococci, also tends to hold the organisms in the close approximation to the tooth surface at and below the gingival margin. Research continues with respect to the basic characteristics of this organism, and increased emphasis is being given to the possibility that its occurrence and its deleterious effects may be facilitated and/or enhanced by pre-existing dental plaque containing cariogenic streptococci. These two aspects of the Institute's research effort, both bearing on dental plaque as the common denominator in caries and periodontal disease, are being carried on in close and effective collaboration.

In addition, basic and clinical studies with respect to the biology of the gums and adjacent tissues continue to provide information which may ultimately contribute to preventive and therapeutic approaches to periodontal disease from the point of view of increasing host resistance to the infectious process. Major support will be given to the ongoing effort to define the nature of those factors, particularly intrinsic enzymes, involved in normal synthesis and breakdown of the major structural proteins of the gums (collagen and elastin), functions which are seriously distrubed in periodontal disease.

Oral Cancer

Delineation of the unique properties of the oral mucous membrane appears essential to any ultimate understanding of malignant change in the mouth. Studies of this type will be continued although at a lower level of activity than in previous years.

Growth and Development

Disordered oro-facial growth is manifested as a spectrum of malfunction, ranging from seriously handicapping cleft palate to malocclusion. Research efforts directed to the goal of providing a more rational understanding of the genesis of these conditions remains a significant aspect of intramural programs.

The role of genetic factors, as defined by laboratory, clinical and field studies of animals and man, continues to be the subject of systematic exploration by intramural scientists. Similarly, the role of environmental factors, particularly those which may exert a deleterious influence during embryonic development, continues to be explored. These studies have now been extended to non-human primate species, in order to obviate doubts which have arisen as to the applicability to man of results derived from studies of lower animal forms.

The net increase of $610,000 includes $250,000 and three positions for program increases, $104,000 for cost of within grade increases, $9,000 for extra day of pay, $32,000 for annualization of positions new in 1971, $120,000 for annualization of 1971 pay increase, and $152,000 for centrally furnished services from the National Institutes of Health management fund. These increases are offset by a decrease of $57,000 in non-initiative programs.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	9	$197,000	11	$255,000	+2	+$58,000
Other expenses...........	---	3,680,000	---	5,153,000	--	+1,473,000
Total..................	9	3,877,000	11	5,408,000	+2	+1,531,000

Program Plans for 1971 and 1972

The Institute's resources for collaborative research and development are largely focused on the special initiative program to prevent or control dental caries within this decade. Accordingly, the National Caries Program of the NIDR will be expanded pursuant to the plan prepared for the Secretary of Health, Education, and Welfare in January 1970. With the advice and endorsement of the institute's advisory committee ("Caries Task Force") the following categorical areas in collaborative research and development will be augmented under the anticipated increases.

> Dentobacterial plaque prevention--More extensive and intensive studies, laboratory and clinical will be mounted in such areas as antimicrobial agents, metabolic regulators, enzymatic plaque removal, and immunological methods.
>
> Tooth surface protectors--Additional developmental projects, field investigations, and clinical trials will be initiated with respect to sealants, plaque repellent surface modifiers, and fluorides.
>
> Dietary additives--Further laboratory studies and clinical trials will be conducted on such dietary factors as phosphates, trace elements, sugar substitutes, and antimetabolites.
>
> Multifactorial oral health procedures--Studies will be mounted involving a combination of two or more procedures such as restoration of carious areas, oral hygiene procedures, topical fluoride, and use of adhesive sealants.
>
> Epidemiology--Surveys will be made to obtain more accurate prevalence data in unique populations, root caries surveys, and microbiological surveys.
>
> Basic investigation--Expansion of studies of tooth transplant rejection.

A portion of collaborative funds would be used also to augment basic investigations representing direct extensions of ongoing intramural projects.

In addition, modest expansion is planned for research and development of promising new adhesive restorative materials. By reducing the sacrifice of sound tooth in cavity preparation, such materials should greatly prolong the useful life of the teeth. Concommitantly, the cost of restoring teeth damaged by caries would be reduced by simplifying the preparation of cavities for filling and by reducing the frequency with which fillings would need replacement.

Research contracts will continue to be utilized as the principal mechanism for field studies and applied research.

The increase of $1,531,000 includes $1,500,000 and two positions for the National Caries Contract Program, $8,000 for within grade increases, $8,000 for annualization of positions new in 1971, $13,000 for annualization of 1971 pay increase, and $2,000 for centrally furnished services from the National Institutes of Health management fund.

Biometry, Epidemiology and Field Studies

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	23	$450,000	26	$536,000	+3	+$86,000
Other expenses............	---	297,000	---	402,000	--	+105,000
Total...................	23	747,000	26	938,000	+3	+191,000

Program Plans for 1971 and 1972

These funds will provide support for the scientific staff in the design and subsequent analysis of a wide variety of complex experimental investigations, ranging from basic to clinical. Especially essential at this point in time is the role of the Institute's biometric arm in the formulation and analysis of field investigations relating both to factors affecting the prevalence of oral disease in the population at large, and to the effectiveness of new or improved means, agents, or techniques of diagnosis and/or control of oral disease.

In concert with the Institute's ongoing National Caries Program effort, program emphasis will focus on expanded field trials of various caries preventive measures, including the enzyme dextranase.

Similarly, field studies of children and adults will be implemented with respect to the prevalence of cariogenic bacteria of the oral streptococcal type in humans. Of particular importance is the need of attaining more precise information regarding: (1) the mode of transmission of the organism; and (2) the degree of correlation between the severity of dental decay and the extent of streptococcal infection.

The increase of $191,000 includes $150,000 and three positions for expansion of research under the National Caries Program, $1,000 for extra day of pay, $14,000 for annualization of positions new in 1971, $13,000 for annualization of 1971 pay increase, $8,000 for within grade salary increases and a net increase of $5,000 for centrally furnished services from the National Institutes of Health management fund.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	33	$507,000	33	$558,000	--	+$51,000
Other expenses...........	---	345,000	---	371,000	--	+26,000
Total..................	33	852,000	33	929,000	--	+77,000

Support for the administration of extramural programs, including research grants, fellowships and training grants, is provided by these funds. Development, review, and evaluation of these programs are the responsibility of the Institute staff and the National Advisory Dental Research Council. Continued surveillance of scientific activities and progress is maintained in addition to recording and reporting the scientific and fiscal data pertinent to all grants.

The increase of $77,000 includes $2,000 for extra day of pay, $8,000 for within grade pay increases, $12,000 for FTS cost increase, $39,000 for annualization of 1971 pay increase, and $16,000 for centrally furnished services from the National Institutes of Health management fund.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	23	$374,000	23	$396,000	--	+$22,000
Other expenses...........	---	68,000	---	73,000	--	+5,000
Total..................	23	442,000	23	469,000	--	+27,000

These funds provide for the support of the Institute Director and his immediate staff. They, in turn, are responsible for the administration and coordination of Institute programs, monitoring new developments in dental research in this country and abroad, and for providing leadership in new approaches to scientific investigations; the advancement of academic science, and the augmentation of the dental research manpower resource of the country.

The increase of $27,000 includes $1,000 for extra day of pay, $10,000 for within grade pay increases, $11,000 for annualization of 1971 pay increase, and $5,000 for centrally furnished services from the National Institutes of Health management fund.

Program Purpose and Accomplishments

Activity: Research Grants. (Public Health Service Act, Part IV, Part C)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$16,962,000	Indefinite	---	$18,886,000

Purpose: Research grants support fundamental, clinical and applied research studies in such areas as dental caries, periodontal disease, oral-facial growth and development and dental restorative materials. Support is furnished for studies designed to advance scientific frontiers and exploit emerging research opportunities. In addition, support is furnished for clinical research centers, dental research institutions and general research support grants.

Explanation: Research funded under this activity ranges from single objective projects to broadly based, multidisciplinary programs involving the collaboration of a number of scientists. These grants are made to scientists or groups of scientists at universities, colleges, hospitals, research institutions, and other non-profit institutions.

Accomplishments in 1971: 189 grants were supported in 1971 compared to 231 in 1970. These grants support research in: Dentitional diseases, periodontal diseases, developmental biology and oral-facial anomalies, biomaterials, soft tissue stomatology, and general oral sciences programs. In the Dental Research Institute program five institutes or centers are now being supported. The centers are beginning to have a strong impact on dental education associated with them.

Objectives for 1972: 208 grants will be supported in 1972 compared to 189 in 1971. Emphasis will be on research which is part of the National Caries Program and areas in which research opportunities are emerging. The National Institute of Dental Research initiated a new mechanism of research support, a Special Dental Research Award Program to stimulate and help newly trained investigators remain active in dental research.

Activity: Fellowships. (Public Health Service Act, Title IV, Part C)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$1,601,000	Indefinite	---	$1,367,000

Purpose: Funds for Fellowships are used for support of clinical and basic research training. Applications under this program are for special fellowships, predoctoral and postdoctoral fellowships and career and career development awards.

Explanation: Highly skilled dental manpower is in increasing demand. To help meet this demand, fellowships are awarded with major emphasis on dental scientists who wish to pursue training in clinical disciplines.

Accomplishments in 1971: There were 97 fellowships supported in 1971 compared to 102 in 1970. Of these, 61 were continuations of previously awarded fellowships and 36 were new awards.

Objectives in 1972: The Fellowship program for fiscal year 1972 will support 82 awards, of which 60 are continuations. The 22 new awards will be awarded generally to applicants in the area of clinical research, allowing for a new emphasis and expansion of support for clinical research investigators.

Activity: Training Grants. (Public Health Service Act, Title IV, Part C)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$4,285,000	Indefinite	---	$4,285,000

Purpose: Training grants assist public and other non-public institutions in offering training programs to individuals interested in careers in dental research and related fields.

Explanation: Training grants are the principal means of providing support for individuals training for careers in dental research and teaching. Training grants also provide additional training for individuals with the necessary clinical skills in the disciplines associated with career development; e.g. embryology, anthropology, and genetics.

Accomplishments in 1971: In fiscal year 1971, the Dental Institute sought to expand the Clinical Research Training Programs, as well as continue the support of several combined degree (DDS-PhD) programs in university graduate schools. These schools are now graduating their first trainees under this combined degree program.

Objectives for 1972: Funds requested for 1972 will provide the same dollar level as in 1971, and will support 81 awards compared to 85 in 1971, a decrease of 4 graduate training grants.

Activity: Laboratory and Clinical Research. (Public Health Service Act, Title IV, Part C)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
216	$5,937,000	Indefinite	219	$6,547,000

Purpose: The Laboratory and Clinical Research studies of the Institute are concerned with the causes, treatment, control and prevention of dental diseases and disorders including caries, periodontal pathoses, oral-facial anomalies and oral cancer.

Explanation: Treatment, control and prevention of oral disorders and diseases are studied through both basic and applied clinical research.

Accomplishments in 1971: In fiscal year 1971 the intramural effort, in dental caries, was evaluation of treatment with antibiotics and other bactericidal agents; assessment of the enzyme dextranase; and the testing of techniques to extend the benefits of fluoride to a wider share of the population. Other areas of study included continued research on the basic characteristics of the bacterial agent Odontomyces Viscosus and the functions of the enzymes involved in the synthesis and breakdown of the proteins of the gums as they related to periodontal disease; continued research on soft tissue lesions of the mouth, cleft palate and malocclusion.

Objectives for 1972: The intramural research programs will continue to obtain new information relating to various oral-facial malfunctions, including dental caries, periodontal disease, oral cancer and abnormal oral-facial development. The intramural research approach involves a tripartite commitment of its resourses to (1) clinical and applied investigations of specific questions stemming from progress at the basic level; (2) clinical trials of therapeutic or preventive concepts evolved from basic and applied research, and (3) further definition of the distribution and nature of oral-facial diseases on an epidemiologic or geographic basis.

Activity: Collaborative Research and Development. (Public Health Service Act, Title IV, Part C)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
9	$3,877,000	Indefinite	11	$5,408,000

Purpose: The activities of the Collaborative Research and Development Activity are aimed at the reduction and eradication of dental caries, and the development of new adhesive restorative materials.

Explanation: The programs of this activity are carried out by collaborative contracts with other federal agencies, university research centers, and industrial research organizations.

Accomplishments in 1971: Initiated a full scale long term field trial for the reduction of caries by intraoral use of the enzyme dextranase; initiated four long term field trials of an adhesive sealant based on preliminary small scale trials showing that it protected occlusal surfaces of teeth against caries for at least two years; conducted a clinical study of the effects of sugars and other nutrients on dental plaque, preliminary to testing the anticaries effect of trimetaphosphate as food additive; initiated a clinical study to correlate the fluoride and other trace element content of dental enamel with caries experience; initiated projects to evaluate new marine and synthetic adhesives that might lead to improved filling materials.

Objectives for 1972: An increase of $1,516,000 and 2 positions in 1972 will be used to implement, on a larger scale, the National Caries Program in such projects as the following: (1) clinical research with enzymes active on dental plaque; (2) intensive local application of fluoride to the teeth; (3) development of means to deliver suitable amounts of fluoride to the more than 40,000,000 persons in the United States who do not have access to community water supplies; (4) extended laboratory and clinical research with new improved adhesive sealants; (5) clinical research to determine whether certain phosphates can be incorporated in the diet effectively to reduce caries in humans; (6) demographic and laboratory investigations to determine if caries can be prevented by dietary intake of certain groups of trace elements; and (7) a coordinated testing program to select antibiotics and antiseptics suitable for use in human oral hygiene, particularly to control caries producing bacteria.

National Institutes of Health

Activity: Biometry, Epidemiology and Field Studies. (Public Health Service Act, Title IV, Part C)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
23	$747,000	Indefinite	26	$938,000

Purpose: This activity is concerned with the planning, conduct and analysis of epidemiologic and field investigations.

Explanation: Epidemiologic and field studies are involved with such matters as prevalence of disease and effectiveness of new or improved methods of diagnosis, control and prevention. These studies are performed by Institute scientists supported from direct operating funds.

Accomplishments in 1971: Research has continued in the design and subsequent analysis of a wide variety of experimental investigations ranging from basic to clinical and including factors affecting the prevalence of oral disease in the population at large and the effectiveness of new and improved techniques for diagnosis and/or control of oral disease.

Objectives for 1972: As part of the National Caries Program expanded field trials of various caries preventive measures will be undertaken. Field studies of children and adults will be implemented with respect to the prevalence of cariogenic bacteria of the oral streptococcal type in humans. The mode of transmission of the organism and the degree of correlation between the severity of dental decay and the extent of streptococcal infection are other areas in which more precise information will be compiled.

Activity: Review and Approval of Grants. (Public Health Service Act, Title IV, Part C)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
33	$852,000	Indefinite	33	$929,000

Purpose: This activity provides support for the administration of extramural programs, surveillance of scientific activities and reports on the fiscal and scientific data relevant to all transactions.

Explanation: It is the responsiblility of this activity to review and evaluate the research grant, fellowship and training grant programs, and to insure the effectiveness and efficiency of the total dental science programs in academic institutions.

Accomplishment in 1971: This activity conducted the scientific and administrative review of all research grants, fellowships and training grant applications submitted to the Institute for funding and maintained surveillance over all active grants. In addition, the staff established policy and guidance for the operation of the program.

Objectives for 1972: This activity will continue to provide scientific and administrative review of all institute grants and surveillance over active grants.

Activity: Program Direction. (Public Health Service Act, Title IV, Part C)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
23	$442,000	Indefinite	23	$469,000

Purpose: This activity provides support for the Institute Director and his immediate staff, who are responsible for the administration, coordination and direction of the Institute programs.

Explanation: The Institute Director and his immediate staff are responsible for keeping abreast of new developments in the field of dental research and relevant higher education, and for providing leadership of promising new approaches in scientific investigations and relevant manpower training.

Accomplishments in 1971: Administrative policies and procedures were devised and implemented for the operation of the National Caries Program. Operational objectives and plans were formulated and approved under NIH and DHEW guidelines.

Objectives for 1972: This activity will continue to provide support for the administration, coordination, and direction of Institute programs.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Laboratory and clinical research			
Senior Dental Surgeon.....................	C.O.	1	$20,175
Microbiologist............................	GS-14	1	19,643
Laboratory Assistant......................	GS-4	1	5,853
		3	45,671
Collaborative research and development			
Contract Administrator....................	GS-14	1	19,643
Clerk-Typist..............................	GS-5	1	6,548
		2	26,191
Biometry, epidemiology and field studies			
Senior Scientist..........................	C.O.	2	40,350
Statistical Clerk.........................	GS-4	1	5,853
		3	46,203
Total new positions, all activities..		8	118,065

National Institute of Dental Research

STATEMENT OF DR. SEYMOUR J. KRESHOVER, DIRECTOR

ACCOMPANIED BY:
    HERBERT CHRISTOFERSON
    MRS. PETTINATO

CHILDREN'S ORAL HEALTH

Senator Cotton. Now the National Institute of Dental Research, Dr. Kreshover.

Dr. Kreshover. I have with me Mr. Christoferson, our executive officer, and behind me is Mrs. Pettinato, our budget officer. I would like to present briefly some of the highlights of our program.

The very limited resources that we have at our command require focus on only the highest program priorities. To generalize, one area of principal focus is in connection with doing something meaningful about children's oral health problems inasmuch as they provide a most essential base for dental health in the adult years. Secondly, we place emphasis on prevention because, unlike many of medicine's brilliant successes with cures, dental problems are largely irreversible.

The Nation's major oral health problems and how we propose to deal with them have been described in a 5-year plan that was submitted in response to the committee's request last January.

While this plan is a matter of record, I would like to take a few minutes to highlight it for purposes of emphasis. The chief dental problem confronting children today is dental caries or tooth decay. You have heard a lot of late about adequacy of a science base as it relates to disease entities. In connection with the Dental Institute's programs, we believe that we stand closest to making significant strides forward in the area of dental caries because of the extent of the science base.

Accordingly, a national caries program was begun with funding in the last quarter of the immediate preceding fiscal year. This program attacks the caries problem along three principal fronts: (1) trying to do something about the etiology or cause which is bacterial, (2) trying to do something about the dietary factor, and (3) trying to do something about host resistance or susceptibility.

Significant results that I need not take too much time of the committee to recite now have been made which give promise for the future. We hope that in the course of this decade the disease can be significantly reduced. While it is difficult in describing dental programs to attach much significance to them from the standpoint of drama, their impact is significant when viewed in such other dimensions as economy and redeployment of already severely limited manpower.

Emerging today as another area, we believe, of very high priority that I would like to spend a moment to talk about is the periodontal diseases. To provide you again with a base for understanding, you will recall that tooth loss suffered after the age of 35 years is primarily attributable to this disease category.

Senator Cotton. That is the gum?

PERIODONTAL DISEASE

Dr. KRESHOVER. That is diseases of the gum and the supporting bone that fixes the tooth in the jaw. Again I would emphasize that while we recognize periodontal diseases as significant in adult life, we do know today that it has its beginnings in many instances during the childhood years.

Our research activities have been primarily along several fronts, some representing meaningful advances. Among these are 1.) identification of certain kinds of periodontal disease and of the specific organisms that cause disease; 2.) the discovery by one of our Institute scientists and his associates of a so-called enzyme that causes destruction of the principal protein which constitutes the connective tissues of the supporting structures of the teeth, and 3.) the recent evidence that allergic—immunological phenomena are of considerable significance. From the standpoint of prevention, the finding closest to application is that the dominant form of disease, characterized by inflammation, is a plaque infection.

In order to emphasize the fact that our dental institute programs are concerned with more than what "dental" ordinarily means, I should emphasize that we are charged with responsibility in a broad dimension of deformities and ills of the oral-facial region.

I would like to say that the mouth is vital to communication, that is, speech; that it is vital to respiration; and that it is vital to nutrition. Accordingly, facial abnormalities such as cleft palate and cleft lip, as well as malocclusion, have a high priority in our consideration. I won't take the time to recount some of the advances made in this area. They are small, but we are only really beginning to scratch the surface in this important area of research.

A newly emerging area that we are beginning to give attention to is pain control. The ordinary expressions of pain are manifested in the face. However, dental pain itself is perhaps the most common of all pain that man experiences. Yet we know very little about its origins, control, and prevention. Accordingly, we are beginning to give this field some measure of support.

Finally, we believe that an important area of concern is the common ulcerations of the lips and mouth. These are extremely painful, and are of two varieties, for which the cause of only one is well established.

Much remains to be done by our Institute and we have described opportunities for further development in our 5-year report to this committee.

Finally, I would like to make a few comments about our Dental Research Institutes Centers because, Mr. Chairman, you have expressed in the past an interest in the one located in your own State of Washington. The program now has had 4 years of experience. All of the Centers are building upon and extending institutional strength along a variety of fronts to bolster a broad dental research effort, as well as facilitating the cooperation of a wide range of biological, physical, and social sciences in studies of common interest. The centers thereby allow an adaptation of many scientific fields to dental research.

What is our success to date? I believe the best way to describe it is that they are bringing dental science and dental education into the mainstream of biology and medicine. In this regard I might take this opportunity to say that one of the unique features that our Institute enjoys is in being a member of the research community that constitutes the NIH and that we derive much of our strength from collaborative enterprise in this kind of setting.

The budget request for fiscal 1972 before you, Mr. Chairman, is $38,829,000, representing an increase of $4,126,000 over the 1971 operating level of $34,703,000. The increase is reflected in two areas. I have described both of them briefly. One is $2.9 million for the national caries program and the other is $1.5 million for the Dental Research Institute program.

I will be happy to answer any questions you might have. Thank you.

Senator MAGNUSON (presiding). You talk about child dental health. Are you familiar with the bill I introduced last week?

Dr. KRESHOVER. Yes, sir; I am.

Senator MAGNUSON. Do you think that bill will be helpful?

Dr. KRESHOVER. Yes, sir; I believe it would be very helpful.

Senator MAGNUSON. I mean to meet the children's problem you mentioned here?

Dr. KRESHOVER. Yes, sir; very much so.

Senator MAGNUSON. We can't discuss the funding of that now, but I think the legislative committee will pass it out next week so that we can get moving on it and see if we can do it. It was highly endorsed by the dental societies and all the people involved.

Dr. KRESHOVER. It surely was.

Senator MAGNUSON. Also the administration endorsed it.

Senator COTTON. Is that bill confined to Washington or does it take in New Hampshire, too?

Senator MAGNUSON. It takes in New Hampshire, it takes in rural areas, and would help all children everywhere.

Now in the House committee you talked a great deal about auxiliary dental personnel.

Dr. KRESHOVER. I did not, sir.

Senator MAGNUSON. I thought you did.

Dr. KRESHOVER. Dr. Endicott's program in the Bureau of Health Manpower Education contains a divisional component identified as the Division of Dental Health, which has this responsibility. I may have referred to it.

Senator MAGNUSON. You said only by an increase in the supply of auxiliary dental personnel can we reach children in rural areas, which is true, I would say.

Dr. KRESHOVER. I believe that was in response to one of the Congressmen's questions.

SHORTAGE OF DENTISTS

Senator MAGNUSON. Yes. I am hopeful that the training programs in all these health manpower programs will reach down to get auxiliaries and dental assistants and these people who can alleviate the shortage of dentists, and other professionals.

Now we always use the figure we are 50,000 doctors short. I suppose the figure is the same with dentists.

Dr. KRESHOVER. I received these figures from Dr. Bruce. In the year 1970 the number of dentists was 102,200. The projection of need for 1980 is at the level of 176,000. Our estimated shortage by that time is over 56,000 dentists.

Allied personnel, of course, are even in greater short supply.

Senator MAGNUSON. The problem, of course, with dental auxiliaries is to induce them to settle in shortage areas. But something should be done in this field just like doctor's assistants.

I did go to the dentist the other day and he cleaned my teeth. There is no reason for a dentist—he is a good dentist—why he should spend a half-hour cleaning my teeth. He has some people out there waiting with more serious problems than that. Somebody else could just as well do it and be trained to do it.

Do you think you are making some progress on caries?

Dr. KRESHOVER. Yes, sir.

Senator MAGNUSON. Maybe by the time a decade rolls around, we might see some real light.

Dr. KRESHOVER. Yes, sir. I would like to recall a comment of Dr. Marston's earlier today. It is difficult to compare cancer with caries, but from the standpoint of overpromising, we are not promising a cure by that time. However, we do hope there will be significant enough progress to make very significant impact on the oral health status of our people.

Senator MAGNUSON. You have touched an interesting spot here with all of us. What are you doing about pain control? What are you—what can you do about it?

Senator COTTON. Take aspirin.

Dr. KRESHOVER. Much of the direction of research up to the present time has been in connection with development of new and improved anesthetic agents. There should also be recognition that in addition to pain as a symptom or manifestation of disease, there is another kind of pain and another kind of anxiety that is particularly unique to dentistry. That is the suffering of a patient in anticipation of a dental visit. This is an area that regrettably has been ignored and that we are beginning to pay some attention to today.

Needless to say, this encompasses not only the development of approaches to relieve anxiety, but also encroaches on the broad field of behavioral science.

Senator MAGNUSON. If you know we are going to get hurt a little bit, how are you going to stop us from having anxiety?

Dr. KRESHOVER. Education.

Senator MAGNUSON. Education, getting us in a trance, saying he is not going to hurt me?

CHANGES IN DENTISTRY

Dr. KRESHOVER. The image of dentistry is very rapidly changing today from a technological kind of pursuit, a trademan's vocation, to a profession that, indeed, is a part of a broad base of biology and medicine, as I indicated earlier.

Senator MAGNUSON. I think this is true with children. If the mother and father is going to go to a dentist, say he has a dental appointment and if the kids hear them hollering about the dentist is going to do this or that to me, when the child has to go, he remembers the parents saying this and he is scared to death. I think that happens.

Dr. KRESHOVER. Yes. Also the child's belief that he is not going to see a doctor, he is going to see a dentist. I believe that we are rapidly identifying the fact that dentists and physicians are two kinds of doctors.

Senator MAGNUSON. To me a dentist is a dentist and I don't like to go. I don't like to go at 2 o'clock or any other time.

One last question. The Senators from California want to know what is the trouble out there at the dental health center in San Francisco?

Dr. MARSTON. This, again, is under the Bureau of Health, Manpower, Education.

Senator MAGNUSON. It is not under yours?

Dr. MARSTON. Yes, sir; it is part of the NIH, but it is under Dr. Endicott in that Bureau.

Senator MAGNUSON. Does anybody know?

Dr. MARSTON. Yes, sir; Dr. Endicott does, but he is representing me at another meeting. He will be back in 15 or 20 minutes. It might be just as well if we could discuss the matter as a part of the BHME appropriation.

Senator MAGNUSON. We will recess for 5 minutes while Senator Cotton and I go over to vote.

(A brief recess was taken.)

National Institutes of Health

National Institute of Arthritis and Metabolic Diseases

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

For expenses necessary to carry out title IV, part D, of the Public Health Service Act with respect to arthritis, rheumatism, and metabolic diseases, [$138,339,000] *$135,433,000.*

Amounts Available for Obligation

	1971	1972
Appropriation	$138,339,000	$135,433,000
Real transfers to:		
"Departmental Management"	-30,000	---
"Research Resources" (proposed transfer for increased pay costs)	-75,000	---
"John E. Fogarty International Center for Advanced Study in the Health Sciences" (proposed transfer for increased pay costs)	-54,000	---
"Division of Biologics Standards" (proposed transfer for increased pay costs)	-150,000	---
"St. Elizabeths Hospital" (proposed transfer for increased pay costs)	-74,000	---
Comparative transfers to:		
"Office of the Director"	-744,000	---
"National Eye Institute"	-69,000	---
"National Heart and Lung Institute"	-78,000	---
"Health Manpower"	-3,597,000	---
"Office of the Director"	-66,000	---
Comparative transfer from:		
"National Institute of Allergy and Infectious Diseases"	+1,023,000	---
Total, obligations	134,425,000	135,433,000

Obligations by Activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase or Decrease Pos.	Increase or Decrease Amount
	Grants:						
156	Research................		$89,803,000		$91,491,000		+$1,688,000
	General research support grants............		(8,123,000)		(7,243,000)		(-880,000)
	Scientific evaluation and planning..........		(20,000)		(20,000)		(--)
	Categorical clinical research centers...........		(1,380,000)		(1,380,000)		(--)
171	Fellowships.............		5,740,000		5,094,000		-646,000
174	Training................		11,475,000		11,475,000		(--)
	Direct Operations:						
176	Laboratory and clinical research.....	491	17,727,000	491	17,958,000	--	+231,000
181	Collaborative research and development.......	21	5,953,000	21	5,477,000	--	-476,000
186	Biometry, epidemiology and field studies.....	31	921,000	31	949,000	--	+28,000
189	Review and approval of grants............	63	2,410,000	63	2,572,000	--	+162,000
190	Program direction.......	21	396,000	21	417,000	--	+21,000
	Total obligations.....	627	134,425,000	627	135,433,000	--	+1,008,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions.......	627	627	--
Full-time equivalent of all other positions............................	38	38	--
Average number of all employees..........	618	645	+27
Personnel compensation:			
Permanent positions....................	$9,151,000	$9,859,000	+$708,000
Positions other than permanent..........	198,000	183,000	-15,000
Other personnel compensation...........	53,000	86,000	+33,000
Subtotal, personnel compensation......	9,402,000	10,128,000	+726,000
Personnel benefits.......................	907,000	962,000	+55,000
Travel and transportation of persons......	230,000	240,000	+10,000
Transportation of things.................	68,000	68,000	--
Rent, communications and utilities........	230,000	240,000	+10,000
Printing and reproduction................	180,000	189,000	+9,000
Other services:			
Project contracts......................	5,339,000	4,839,000	-500,000
Payment to NIH management fund..........	7,019,000	7,217,000	+198,000
Other..................................	2,007,000	1,556,000	-451,000
Supplies and materials...................	1,540,000	1,550,000	+10,000
Equipment................................	485,000	384,000	-101,000
Grants, subsidies and contributions.......	107,018,000	108,060,000	+1,042,000
Total obligations by object............	134,425,000	135,433,000	+1,008,000

Summary of Changes

1971 estimated obligations	$134,425,000
1972 estimated obligations	135,433,000
Net change	+1,008,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase	--	---	--	+$394,000
2. Within-grade pay increases	--	---	--	+184,000
3. One extra day of pay in 1972	--	---	--	+37,000
4. F.T.S. rate increase	--	---	--	+10,000
5. Noncompeting research grants	--	$55,442,000	--	+3,773,000
B. Payment to "National Institutes of Health Management Fund" for centrally furnished services	--	6,840,000	--	+198,000
Total, increases	--	---	--	+4,596,000
Decreases:				
A. Program:				
1. Research grants	--	89,803,000	--	-2,085,000
2. Fellowships	--	5,740,000	--	-646,000
3. Laboratory and clinical research	491	11,955,000	--	-357,000
4. Collaborative research and development	21	5,889,000	--	-500,000
Total, decreases	--	---	--	-3,588,000
Total, net change				+1,008,000

Explanation of Changes

Built-in Increases--These increases will provide: $394,000 for annualization of the 1971 pay increase; $184,000 for within-grade pay increases in 1972; $37,000 for one extra day of pay in 1972; and $10,000 for increased costs in 1972 of using the Federal Telecommunications System.

Research grants--An increase of $3,773,000 for noncompeting grants and a decrease of $1,205,000 for new and competing renewal grants results in a net increase of $2,568,000 which will support 205 fewer grants than the 2,028 supported in 1971. A total of 1,823 grants will be supported in 1972. The request also includes a decrease of $880,000 for general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships--The decrease of $646,000 will fund 63 fewer awards over the 1971 level of 343 for a total of 280.

Laboratory and clinical research--The decrease of $357,000 includes a reduction of $336,000 for non-recurring building renovations in 1971.

Collaborative research and development--The decrease of $500,000 in the Artificial Kidney Program will reduce the number of active contracts from approximately 65 in 1971 to 57 in 1972, a decrease of 8 contracts.

Significant Items in House and Senate Appropriation Committee Reports

Item	
1971 House Report	
Clinical Research Studies at the Phoenix, Arizona, Indian Medical Center	
1. "The Committee...directs that at least the minimum staff requirements be made available for this important new clinical research approach."	1. Twenty four additional positions were made available to the Institute in 1971 for initial staffing requirements. Clinical studies on gallbladder disease were undertaken with the first staff additions. Studies on diabetes will be phased in when additional staff is employed.
1971 Senate Report	
Clinical Research Studies at the Phoenix, Arizona, Indian Medical Center	
1. "The Committee commends the National Institutes of Health and the Indian Health Service for their joint effort to undertake important clinical research among the Indian population of this country. The committee intends that some of the funds for the Institute be used for the first-year requirements and personnel for this unit."	1. Same as above.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act Section 301--Research and Investigation, in general	Indefinite	$135,433,000
Title IV, Part D--National Institute on Arthritis, Rheumatism and Metabolic Diseases	Indefinite	$135,433,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in Section 301 of the Public Health Service Act.

The Public Health Service Act, Title IV, National Research Institutes, Part D, National Institute on Arthritis, Rheumatism, and Metabolic Diseases, National Institute on Neurological Diseases and Blindness, and other Institutes.--

"Sec. 431 (a) The Surgeon General shall establish in the Public Health Service an institute for research on arthritis, rheumatism, and metabolic diseases...."

"Sec. 433 (a) Where an institute has been established under this part, the Surgeon General shall carry out the purposes of section 301 with respect to the conduct and support of research relating to the disease or diseases to which the activities of the institute are directed, through such institute and in cooperation with the national advisory council established or expanded by reason of the establishment of such institute. In addition, the Surgeon General is authorized to provide training and instruction and establish and maintain traineeships and fellowships, in such institute and elsewhere, in matters relating to the diagnosis, prevention, and treatment of such disease or diseases with such stipends and allowances (including travel and subsistence expenses) for trainees and fellows as he may deem necessary, and in addition, provide for such training, instruction, and traineeships and for such fellowships through grants to public and other nonprofit institutions."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental Management	-$30,000	To establish the Facilities Engineering and Construction Agency.
Research Resources	-75,000	Proposed transfer for increased pay raise costs.
John E. Fogarty International Center for Advanced Study in the Health Sciences	-54,000	" " "
Division of Biologics Standards	-150,000	" " "
St. Elizabeths Hospital	-74,000	" " "
Comparative transfer to:		
Office of the Director	-744,000	To provide an equitable distribution of the Management Fund in 1972.
National Eye Institute	-69,000	" " "
National Heart and Lung Institute	-78,000	Transfer of regular research grants related to pulmonary diseases.
Health Manpower	-3,597,000	Transfer of institutional support funds to Health Manpower.
Office of the Director	-66,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
Comparative transfer from:		
National Institute of Allergy and Infectious Diseases	+1,023,000	Transfer of regular research grants for the malnutrition portion of the U.S.-Japan Program.

National Institute of Arthritis and Metabolic Diseases

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$ 68,740,000	$ 73,661,000	$ 90,000,000	$ 81,831,000
1963	91,921,000	98,721,000	105,721,000	103,388,000
1964	114,717,000	113,679,000	114,717,000	113,679,000
1965	113,369,000	113,344,000	113,544,000	113,344,000
1966	119,203,000	121,203,000	123,203,000	123,203,000
1967	129,908,000	133,687,000	135,687,000	135,687,000
1968	143,954,000	143,954,000	147,204,000	153,954,000
1969	151,718,000	141,287,000	147,287,000	143,888,000
1970	137,668,000	137,668,000	155,000,000	146,619,000
1971	132,152,000	138,339,000	140,339,000	138,339,000
1972	135,433,000			

Justification

National Institute of Arthritis and Metabolic Diseases

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	627	$10,309,000	627	$11,090,000	—	+$781,000
Other expenses..........	—	124,116,000	--	124,343,000	--	+227,000
Total............	627	134,425,000	627	135,433,000	--	+1,008,000

General Statement

Established in 1950 under the provisions of Public Law 692, the National Institute of Arthritis and Metabolic Diseases received its first direct appropriation in 1952. For many years prior to 1950, laboratories which now constitute a part of this Institute were concerned with basic studies in chemistry, pathology, pharmacology, physiology, and nutrition. In 1947, they were grouped together into a division known as the Experimental Biology and Medicine Institute. These laboratories throughout their existence have had an outstanding record of accomplishment in fundamental research.

Over the years, the responsibilities of the National Institute of Arthritis and Metabolic Diseases have grown to encompass an unusually diverse area, including the broad spectrum of arthritic, rheumatic, and collagen (connective tissue) diseases; various metabolic disorders, such as diabetes; gastrointestinal diseases, such as peptic ulcer; endocrine malfunctions; dermatological conditions, such as psoriasis; diseases of blood, bone, liver, and kidney; and research in urology, nutrition, and orthopedic surgery.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research projects.........	$80,280,000	$82,848,000	+$2,568,000
Special programs..........	9,523,000	8,643,000	-880,000
Total research grants...	89,803,000	91,491,000	+1,688,000

Introduction

The National Institute of Arthritis and Metabolic Diseases seeks to control disease and promote health through research. Essential to this objective is a broad-scale fundamental scientific approach to the mysteries of health and illness and a marshaling and developing of results for research attacks on specific disease problems. To accomplish this objective, the Institute acquires new biomedical information in the main through scientists supported by about 2,000 research grants at some 400 institutions across the country.

Arthritis and Related Diseases

The arthritic and rheumatic disorders are the nation's most prevalent, painful, crippling diseases, afflicting some 16,800,000 people, according to the U. S. Public Health Service's National Center for Health Statistics. The term "arthritis" refers to inflammation and destruction of joints. Rheumatism, a more general term, usually refers to pain or impairment of function related to tissues outside the joints, such as muscles, tendons, bones, and nerves. About 100 disorders are listed under the combined heading of arthritis and rheumatism.

Rheumatoid arthritis, afflicting about 4 million people in the United States, is the most serious form of arthritis frequently seen by physicians. It is a painful, crippling, sometimes completely disabling disease that costs the nation dearly in diminished income and increased medical expenses. Only 25 years ago little could be done to alleviate the pain or slow the progression toward permanent joint deformity. Today, however, scores of anti-inflammatory or pain relieving drugs are available or under development and various methods of therapy and rehabilitation have improved the prognosis for the afflicted patient. The real hope, nevertheless, lies in understanding the fundamental cause or causes underlying this disease and in preventing the inflammation and degeneration of joints and surrounding tissues characteristic of rheumatoid arthritis.

While the primary cause of rheumatoid arthritis is still unknown, present research is endeavoring to discover whether an infectious process, an autoimmune reaction, or possibly a combination of both processes are the mechanisms by which the disease develops. Institute grantees are continuing to gather data on the possible role of microbial organisms and viruses which have recently been recognized as potential pathogens in rheumatoid arthritis in man. To date, however, firm proof that infectious agents may cause this disorder remains elusive. Researchers are also examining the possibility that rheumatoid arthritis is initiated by an autoimmune reaction, in which the body reacts abnormally and destructively to materials (perhaps released by infection) originating within the body's own tissues.

Work by grant-supported investigators is providing physicians with a constantly growing armamentarium for the management of rheumatoid and other forms of arthritis. For example, a grantee has shown in prolonged clinical trials that penicillamine may be of value in the treatment of rheumatoid arthritis patients with sustained disease activity. Prolonged penicillamine administration not only reduced rheumatoid factor titers, but other classes of abnormally elevated blood levels of immunoglobulins as well, suggesting that the drug may act by suppressing the immune response. Further study is needed to delineate the precise mode of action of this agent.

Other grantees have shown in controlled clinical trials that the potent anti-cancer drug, cyclophosphamide, may be of significant value in the treatment of patients with severe rheumatoid arthritis who are refractory to standard forms of therapy. Use of the drug in large doses, however, was accompanied by a high rate of undesirable side effects, and additional studies will be undertaken to re-evaluate this potent drug in moderated dosages.

Like rheumatoid arthritis, systemic lupus erythematosus (SLE) is one of a group of connective tissue disorders. Connective tissue, comprised mainly of collagen fibers and a glue-like basic matrix called "ground substance," makes up a major part of the body tissues and is essential for its structure and function. SLE is manifested by various disorders in the structure and activity of the skin, joints, blood vessels, and internal organs. It is an insidious, inflammatory disease of considerable gravity. The disorder most often affects people in the 20-40 year age group, particularly young women.

Although the cause of SLE is not known, much evidence points, as in the case of rheumatoid arthritis, to a disorder of the body's immune mechanism which may or may not be tied to a previous infectious process. A grantee of the Institute has detected virus-like particles in the affected kidney tissue of 29 of 30 patients with systemic lupus erythematosus. These morphologic findings do not establish a viral etiology for this connective tissue disorder, but presence of the virus-like particle is of diagnostic importance and tends to differentiate lupus nephritis from other kidney lesions. The findings provide a basis for further studies directed toward positive identification of such particles, their possible etiologic significance, and/or their diagnostic import.

Lupus nephritis is a term used to describe the renal involvement that may complicate systemic lupus erythematosus. Recent studies have revealed that there is a great variation in the clinical and pathologic manifestations of lupus nephritis; it may appear benign, gradually progressive, or rapidly progressive and fatal.

Orthopedics

Orthopedics is that area of medicine and surgery concerned with the musculoskeletal system. Research in orthopedics supported by the Institute is primarily concerned with disorders of the skeletal system in adults.

Research is also directed toward studies of the overlying soft tissues in diseases such as scoliosis (curvature of the spine). Scientists are currently searching for an animal model of this disease that is comparable to the human form. Development of a model should enhance research in this area since biochemical, histological, histochemical and ultrastructural studies could be easily done on muscles, ligaments, cartilage, and bone, tissues presently not readily available.

Osteoporosis, a diffuse reduction in bone density, is a condition resulting from a combination of disuse or immobilization, calcium deficiency, hormonal imbalances, or senility. It is often found in elderly postmenopausal females, often results in vertebral abnormalities and/or frequent fractures of the hip and long bones. Grantees are studying this disease through long-term data collections of individuals on controlled diets and patients with disuse or immobilization of limbs. Since osteoporosis is usually a disease of slow onset and long duration, and bone density decreases slowly, studies of this condition must continue over many years if the cause and possible methods of preventing, controlling, or slowing the process are to be accomplished.

Research is continuing on development of prosthetic devices for total hip replacement. Present materials, while effective for varying periods of time, are not permanent. As a result, replacement of the device may be necessary after several years. Grantees are utilizing a new method for attachment of these devices to bone. Initial results appear promising, but long-range continuing studies will be necessary to evaluate this procedure properly, both as to duration of function of the device and the human response to these new non-biological materials.

Recently, interest has increased in the development of new materials for use as implants. Engineers, metallurgists, and orthopedists are working together to develop and test new materials that more nearly mimic the properties of bone than do the present materials. Again, long-range studies will be necessary to properly evaluate tissue response of these materials. Ceramics, with controlled pore sizes, have been developed and are underoing testing for tissue compatability. One difficulty encountered with ceramics is their brittleness. Efforts to overcome this undesirable characteristic have been partially successful. Methods of binding ceramics to metals are being studied. If successful, those materials may provide the strength necessary for weight bearing as well as porosity which would permit tissue ingrowth through the ceramics' outer layers.

Diabetes

According to the best estimates there are, at present, approximately four million diabetic people in this country. Moreover, another five million of our present population are expected to develop the disease during their lifetime. Factors contributing to the growing prevalence of the disease include the soaring population, increased longevity for diabetics due to improved maintenance care and the rise in obesity which seems to stimulate emergence of frank diabetes in genetically predisposed individuals. Since more diabetics will be living longer and may possibly have more children, an increasing number of their offspring will have it and pass it on.

A complicated disease, for which there is no known cure, diabetes ranks seventh on the list of diseases causing death in the United States. Diabetes has been known for some time to be in part a hereditary disorder. As a result of the body's inability to metabolize carbohydrates normally, the diabetic is unable to convert carbohydrates properly into the stored form, glycogen, or to properly utilize them for the energy required for normal body functions. The carbohydrates, in the form of glucose, accumulate in the blood and overflow into the urine. As the disease progresses, abnormal carbohydrate metabolism becomes associated with a noticeable derangement in the metabolism of fats and proteins and with changes in the cardiovascular system.

The oral anti-diabetic drugs continue to be a prime area of interest for the Institute. A ten-year study of the effects of anti-diabetic drugs conducted by 12 leading medical centers (University Group Diabetes Program or "UGDP") with research grant support from the Institute, has been reported recently and has raised questions concerning the use of the oral hypoglycemic agent tolbutamide (brand name Orinase) in the control of diabetes and its sequelae. The conclusions of the investigation, based on the results obtained in this long-term well-controlled study, were that: "The findings of this study indicate that the combination of diet and tolbutamide therapy is no more effective than diet alone in prolonging life. Moreover, the findings suggest that tolbutamide and diet may be less effective than diet alone or than diet and insulin at least insofar as cardiovascular mortality is concerned." This ten-year study has also resulted in an announced consensus of diabetes study groups representing the American Medical Association, the American Diabetes Association, and the Food and Drug Administration, that this oral hypoglycemic agent should be used only in diabetics with adult onset diabetes in whom the disorder cannot be controlled by diet alone or by diet plus insulin. This shows the importance of clinical research which pursues the definition of the practical utility and ultimate value to patients of new treatments as more basic biomedical information is generated. Study of another oral anti-diabetic drug, phenformin (DBI), now in its eighth year, is being continued by the University Group with support from the Institute.

Insulin

Many diabetes investigators today believe that determination of the precise mode of action of insulin, how it is produced and released by the pancreas and how it does its vital work in human tissues, is essential to clarifying the cause or causes of diabetes, and to preventing or controlling the complications of the disease.

Both protein ingestion and amino acid infusion are known to stimulate insulin secretion in man. This response has been attributed to an increased plasma amino acid concentration, but it has not been known whether amino acids exert a direct effect upon the insulin-producing cells of the pancreas, or whether the effect is mediated through some indirect mechanism. A grantee of the Institute has shown this past year that amino acids, like glucose, exert a direct secretion-stimulating effect on the insulin-producing cells of the pancreas, suggesting that pancreatic blood-amino acid concentrations play an important role in control of insulin secretion.

In other grant-supported research, a scientist has reported on his studies of pancreatic alpha-cell function in normal and diabetic subjects. His research indicates that diabetes is characterized not only by impaired insulin secretion and action, but also by a continuous state of relative or absolute excess of the blood sugar level-enhancing hormone glucagon which is produced in the alpha-cells of the pancreas (in contrast to pancreatic beta-cells which produce and secrete the blood sugar decreasing hormone insulin). Because several actions of glucagon are antagonistic to those of insulin, it is suggested that excess glucagon may exaggerate the metabolic consequences of insulin insufficiency and may unfavorably influence diabetic control. Further study will be required to determine the mechanism of the alpha-cell dysfunction in diabetes.

Prevention or effective control of diabetes requires additional work in many areas not yet adequately investigated. Some of these are: genetic studies in experimental animals to identify a genetic marker for predicting the disease; better measurements of vascular complications and study of the biological events leading to these lethal changes, more work on the factors affecting pancreatic islet cell differentiation; and more work on the actions of insulin and glucagon at the molecular level.

Other Inherited Diseases of Metabolism

Recognition of the other hereditary metabolic diseases, as well as understanding of the mechanisms by which they produce discomfort and dysfunction, has increased immensely over the past half century. Further emphasis needs to be placed on early recognition of these "inborn errors of metabolism" inasmuch as improved medical management can delay the onset of complications and can even permit a longer survival in some instances. Institute and Institute-supported scientists have been particularly productive this past year in their studies of this group of diseases, one of which is cystic fibrosis (CF).

Cystic fibrosis is an inherited generalized metabolic disorder characterized by an abnormality in the products of certain types of glands which secrete fluid to external body surfaces, the lungs and the gastrointestinal tract. The abnormalities which are found in these secretions seem to be responsible for the symptoms and signs that plague the patient.

The principal clinical problems relate to the basic metabolic disorder of external gland secretion. The first of these results from the production of sweat with a high salt content. Due to this defect many patients are unable to conserve salt, especially in hot weather, and are in constant danger of developing profound dehydration, which may lead to death.

A second, and considerably more serious facet of the disease stems from the abnormal functioning of the mucus-secreting glands of the body. In cystic fibrosis, these glands fail to secrete normal, free-flowing fluid. Instead, they tend to produce an abnormally thick, sticky mucus which obstructs the ducts or openings of the glands of the pancreas, a defect which results in impaired digestion.

The third and most important complication involves the lung. Nearly all cystic fibrosis patients develop chronic lung disease at some time during their illness. Thick mucus obstructs the finer air passages in the lung, causing labored breathing and chronic cough. In time bacteria multiply in the accumulated secretions, and the child develops chronic bronchitis or pneumonia. The latter infection is the leading cause of death in these patients.

Among the studies which warrant continued support is one by a grantee who has examined an abnormal factor in the serum of cystic fibrosis patients. Several studies have indicated that the presence of this abnormal factor causes interruption of normal ciliary action in the bronchial mucosa of several experimental animals. The same investigators have now isolated the ciliary inhibiting factor from the sera of cystic fibrosis patients and heterozygotes and identified some of its chemical characteristics.

Another grantee has shown that the skin of patients with cystic fibrosis is deficient in beta glucuronidase, an enzyme linked to salt secretion and mucopolysaccharide metabolism, both of which are abnormal in cystic fibrosis. Further study will be required to learn if such decreased activity represents decreased synthesis of this enzyme, abnormal enzyme structure, or inhibition of the enzyme by some other substance.

Although diabetes and cystic fibrosis are the most widely known of the inherited metabolic diseases, there are many other such disorders for which the Institute serves as the focus of research support. Among these are phenylketonuria, Wilson's disease, galactosemia, alcaptonuria, histodinemia, homocystinuria, familial Mediterranean fever, the various glycogen storage diseases, congenital nonhemolytic jaundice, and many others. Many of these and other metabolic diseases are known to result from an enzyme deficiency. Of the therapeutic approaches to diseases due to hereditary enzyme deficiency, induction or transfer of enzyme activity is in many ways the most attractive.

Metabolic and Endocrine Disorders (unrelated to genetics)

Endocrinology

Endocrinology concerns itself with the study of the endocrine glands and their secretions, the hormones, and with the effect of these secretions on the metabolism and physiology of man. Thus, research in the field of endocrinology is considered one of the most important areas of Institute concern.

For many years endocrinologists were concerned with the clinical conditions resulting from under or over-production of the endocrine glands. In recent years, however, the importance of the hormones as a control factor in the metabolism, growth and reproduction of the whole body and particularly of the individual cells has become more and more evident.

Studies by an intramural scientist and an Institute grantee resulted in the successful synthesis of the active portion of the parathyroid hormone and its influence on the control of calcium metabolism. Two groups of scientists working independently on this puzzling problem reported, almost simultaneously, the complete 84 amino acid sequence that makes up the hormone. One group includes the above-mentioned Institute grantee and an intramural investigator, and the other an intramural scientist of the National Heart and Lung Institute and his associates. The synthesis of an active fragment of this hormone comes after more than 45 years of investigation in many laboratories and has important implications both for better understanding of the biochemical operation of other hormones and of the diagnosis and treatment of a number of human disorders, including hyperparathyroidism, kidney stones, and metabolic bone disease.

An outstanding feat of biomedical research in this area by two groups of scientists working independently of each other came this past year when reproducible, biologically active hypothalamic hormone, thyrotropin- releasing hormone (TRH) was synthesized. Synthesis of this first biologically active hypothalamic hormone opens the way to regulation of several important bio-endocrine functions, possibly including ovulation.

Another very important recent advance made by an Institute grantee is the synthesis of pituitary growth hormone by Dr. C.H. Li and his associates. Dr. Li has been working for several years on the purification of anterior pituitary hormones and on the determination of their physical properties and chemical structure. The successful treatment of many endocrine diseases will ultimately depend on this type of research and the Institute has been instrumental in helping sponsor centers capable of producing such efforts.

Gastroenterology

Gastroenterology is a field of enormous scope, in terms of the number of people affected by disease. Encompassing all the diseases of the digestive tract, which may range from peptic ulcer or liver disease to ulcerative colitis, it is an area of medicine perhaps second only to heart disease in the frequency of physician house and office visits required. Any classification of disorders of the gastrointestinal system includes, in addition to the gastrointestinal tract itself, related organs such as the liver, gallbladder, and pancreas.

Several years ago, Institute grantees in England synthesized gastrin, a hormone which stimulates secretion of gastric juice and more recently another grantee showed that anti-gastrin antibodies produced in rabbits inhibited endogenous gastrin-mediated gastric acid secretion in rats. Since increased blood gastrin levels are correlated with gastro-duodenal ulceration associated with hypersecretion of gastric juice, this suggested the possibility of modifying through such novel approaches excessive gastric acid secretion in disease states such as peptic ulcer. Another grantee has shown that secretin prevented increased blood gastrin in animals and that subjects with duodenal ulcers secrete less of this hormone than do normal subjects, in response to acid. This offers another possible approach to attacking the ulcer problem through an understanding of the basic physiological mechanisms involved and deserves further support.

The two major liver diseases, cirrhosis (on the increase in our adult population) and hepatitis (increasing at an alarming rate among our young population) are both crippling and fatal diseases of great social and economic importance. A most rapidly moving field has been the finding of an association between the presence of a viral-like particle (Australia antigen) and a type of hepatitis transmitted primarily through blood transfusions or by contaminated needles. There is some evidence that fatal liver necrosis or cirrhosis occurs only in those cases of acute viral hepatitis in which the antigen is present. If further work establishes this, much apprehension, and costly medical care could be eliminated in the less hazardous cases. Further work may permit the development of a vaccine effective against hepatitis or a therapeutically effective antibody for Australia antigen.

Gastrointestinal bleeding, which particularly affects older people appears to be increasing in our population as the incidence of ulcers and intake of alcohol and aspirin increases. Diagnosis of the site of the bleeding is still difficult and, in a fair percentage of cases, uncertain. Barium meals, endoscopy and intubations each have their advocates and each is able to differentiate the majority of cases. However, if a more certain and less traumatic procedure could be developed it would be a major advance. One of the Institute grantees is working on a new approach to diagnosis which would be rapid and relatively innocuous for the patient. Methane or radio-active xenon gas, instilled into the colon, is absorbed first and in highest concentrations by the blood supply to that region (portal) and, therefore, if the bleeding is from esophageal varices, the concentration of the gas in samples of blood recovered from the stomach will be high; if from gastric bleeding sites, low.

Heartburn, caused by reflux of acid stomach contents into the esophagus, is probably the most frequent complaint of gastrointestinal origin. More severe forms of this phenomenon occur in esophagitis and hiatal hernia. Despite many published observations, how and why reflux occurs in these individuals and not in others, is largely unknown. Work performed by an Institute grantee is well along toward answering this question and, therefore, to offering some rational and effective, rather than merely empirical treatment of the condition. Studies by these investigators suggest that the important hormone, gastrin, released by the stomach, is at least one factor which controls the baseline pressure of an important physiological structure, the lower esophageal sphincter, which normally prevents stomach acid from entering the esophagus. Patients who have frequent gastroesophageal reflux have lower baseline pressure in this structure than the normal group, perhaps because the sphincter is insufficiently responsive to gastrin or perhaps because insufficient gastrin is released. If this conjecture proves to be correct, new avenues of rational therapy seem probable.

A new concept of how cholesterol gallstones (the most prevalent type) are formed has emerged from recent studies and will be confirmed in experimental work with the Pima Indians of Arizona. The formation of cholesterol gallstones may be due to the secretion by the liver cells of an abnormal bile in which the cholesterol exists in a highly supersaturated state which later precipitates out in the gallbladder. This important finding, which points to the liver as the origin of the disease rather than to the gallbladder itself, channels research effort into a wholly new direction. Bile salts and lecithin are the primary solubilizing agents for cholesterol in bile. By feeding bile acids, the composition of the bile may be changed toward normal. The extensive understanding of cholesterol and lecithin metabolism gained through much research aimed at the problem of atherosclerosis can be directed to find other ways to modify the abnormal bile.

Kidney and Urologic Disease

Among the leading causes of kidney disease are: hypersensitivity disorders involving an overreaction of the immune system and its misdirection against the body's own kidney tissues; infections; circulatory disorders, such as high blood pressure; developmental anomalies; obstructive conditions in which blockage of urine flow results in back-pressure damage to the kidneys, usually with accompanying infection; and other contributing conditions.

A common characteristic of almost all kidney diseases is their tendency to progress eventually to a common end-stage of irreversible kidney failure characterized by uremia. Uremia is the composite of signs and symptoms resulting from the loss of the kidney's functions of removing metabolic wastes from the body and of regulating the internal chemistry of the body. Two main types of kidney failure can be distinquished, acute (and possibly reversible) kidney failure and chronic progressive renal insufficiency. In acute kidney failure, the kidneys are damaged by an acute insult or attack, are shut down rapidly, and the symptoms of uremia develop soon. The damage may be reversible after a short period, and the kidneys may heal and regain normal function.

Chronic kidney failure, however, is brought on by gradually progressive destruction of the kidneys from which they do not usually recover. In these cases the kidneys never regain the ability to reverse the trend toward ultimate, fatal uremia. Unlike the majority of chronic diseases, kidney diseases are particularly likely to cause death to patients in the middle, productive years. The social and economic impact of kidney diseases, therefore, is far out of proportion to what one would expect from simple analysis of the bare statistics.

The development of two dramatic therapeutic approaches to end-stage kidney diseases, chronic kidney hemodialysis and kidney transplantation, has thrust the renal disease problem into the public eye and led to a proliferation of activities directed toward reducing morbidity and mortality. This past year, scientists supported by the Institute have reported on many research findings which shed light on some of the causes and manifestations of chronic renal failure, and which merit continued support.

Kidney transplantation is still a developing treatment modality, but with continued research it should be noted that transplantation depends upon maintenance of the kidney failure patient with the aid of hemodialysis (use of artificial kidneys) until he is ready for an operation and until a suitable donor kidney is available. Dialysis is also used post-operatively as a temporary kidney-sparing measure, and, in case of transplant failure, as a life-saving maintenance method.

The surgical techniques for transplanting kidneys have in large part been developed and are constantly being refined. The body, however, ordinarily defends itself against a "foreign" transplanted organ by elaborating specific antibodies to that graft and by other cellular defense processes. In a series of complex events not at all well defined, the foreign transplanted organ is attacked and may ultimately become functionless. Treatment with special drugs which suppress the host's immune response to transplanted foreign organs of a different tissue "type" (analogous to the well-known, mutually-incompatible blood types) can abort such an attack temporarily. In the long run, however, only organs of identical tissue composition (obtained from an identical twin) or of closely matching antigenic composition bear the promise of prolonged, dependable function in the host.

Thus it has become increasingly apparent that improvement in kidney transplantation and organ transplantation as a whole will depend on additional knowledge of human tissue immunology. Sophisticated methods must be developed for close immunologic matching of donor and recipient tissues. In addition new methodology must be sought for effective long-term preservation of donor organs so that at all times a sufficient number of pre-"typed" (tissue typed) organs with different antigenic composition is available for transplantation into (matching) patients who need them.

Considerable progress continues in the area of kidney transplantation, which integrally include advances in organ preservation and immunosuppression. In the former field, for example, a grantee of the Institute has shown that tissue matching involving both leukocytes and kidney cells improves the survival rate of transplanted human cadaver kidneys. In 1968, an Institute grantee first devised a method of preserving isolated human cadaver kidneys for as long as 37 hours. Thus, time was gained for proper matching of cadaver kidneys which had become available and recipients by tissue typing and for adequate preparation for surgery. Utilization of this kidney preserving device (The "Beltzer Apparatus") now has permitted an important modification of standard phenotyping and cross-matching procedures to a point where optimally matched cadaver kidney transplants may do as well as those from "A" matched (on the Terasaki matching scale) siblings. Conventionally, only the leukocytes of the donor and potential recipients are tissue-typed and subsequently the best matching combination is selected. Under the new system, the recipient's leukocytes are typed and cross-matched to the cadaver donor's kidney cells as well as leukocytes. Apparently there is antigen on the kidney cells not detected on leukocytes during conventional phenotyping. Thus, many apparent "good" matches based on leukocyte-leukocyte typing alone can now be revealed as merely "fair" on the basis of the more complete double matching system, and poor outcome of cadaver transplants due to rejection can be more easily predicted and avoided.

Nutrition

Nutrition has become a major national issue, and the practical application of the science of nutrition holds immediate interest and concern for all population groups. Despite the wide reduction of frank nutritonal deficiency diseases in this country, the margin of safety is not large. Improved methods of determining nutritional status and revised criteria for normal nutritional status have contributed to a new emphasis on the definition and diagnosis of malnutrition. Through application of new principles and laboratory techniques learned in recent years from studies of intermediary metabolism, many supported by this Institute, the evaluation of nutritional status in the absence of overt disease is no longer dependent on ill-defined lesions and symptoms or the subjective judgment of physicians. These advances in knowledge now form the basis for exacting nutrition surveys conducted to discover pockets of malnutrition in vulnerable population groups in the United States. They will also be necessary in many developing countries in order to deal more effectively with endemic malnutrition.

The Institute's research grants program in nutrition can be divided into two groupings: physiology of normal nutrition and nutritional disorders. Projects dealing with physiologic processes of normal nutrition involve body composition, digestion and absorption of nutrients in the gastrointestional tract; appetite regulation and food intake; the biochemistry and physiologic role of nutrients; and their fate in the body; quantitative requirements of proteins and amino acids, carbohydrates, fats and fatty acids, minerals, trace elements, vitamins, and fluids and electrolytes; interrelationships between different nutrients and between nutrients and hormones, and nutrients and enzymes; and the relationship of the intestinal flora to nutrition.

Research in abnormal nutrition involves discovery and definition of deficiency states, nutrient toxicity, obesity, malabsorption of specific nutrients, and the relationship of diet to specific disease entities, such as celiac disease and others. Another major subdivision of these research grants relates to nutrition in specific diseases or stress states, such as in diabetes, bone and joint disease, liver disease, gastrointestinal disease, infectious diseases, disorders of immunity, anemia, endocrine disorders, gallbladder disease, inborn errors of metabolism, skin disorders, kidney disease and urolithiasis, and stress (including surgery, trauma, wound healing and environmental extremes).

A number of outstanding research findings by grant-supported investigators will be followed up carefully during the next fiscal year. These include work on the biologically active form of vitamin D, 25-hydroxycholecalciferol. In earlier studies the grantee investigators had isolated the major biologically active form of vitamin D3, 25-hydroxycholecalciferol (25-HCC), had identified the liver as the site of vitamin D3 conversion to 25-HCC, and had shown that the metabolite is markedly more effective than the conventional form of the vitamin in preventing or treating rickets in animals. This past year, they have shown that patients with vitamin D-resistant rickets (who do not respond to conventional treatment with vitamin D3) respond symptomatically, chemically, and radiographically to high doses of 25-HCC with no evidence of toxicity. Their findings suggest that 25-HCC will prove to be a safe, effective treatment for vitamin D-resistant rickets.

Another grantee has demonstrated the feasibility and effectiveness of one-time parenteral administration of iodized oil, in lieu of ingestion of iodized salt, in the treatment and prevention of endemic goiter in isolated population groups. Endemic goiter continues to be a significant health problem in many areas of the world, including certain remote sections of Ecuador and Peru, where iodized salt is unknown and where attempts of introduction of such salt among the poor Indian population have been promising. Spurred by earlier successful field trials by other scientists in New Guinea, a pilot program using iodized poppy seed oil has been instituted in several rural communities in Ecuador and Peru. Results after approximately two years of study have indicated the feasibility and effectiveness of such a prophylactic program. There has been a sharp reduction in the incidence of goiter, and goiter-associated cretinism has not appeared among progeny of treated populations. Such a procedure is technically simple, free of serious risk, and is recommended for endemic goiter regions where salt-iodization programs have not yet been implemented. Several more years of observation, however, are needed to assess the full impact of the program in this and related health areas.

Metabolic studies conducted earlier by other investigators in Peru supported by the Institute suggested that malnourished infants and children at risk might thrive on a diet containing cottonseed flour (CSF) as the only source of protein. Prolonged feeding trials now have established that properly processed CSF, at adequate levels of intake, can serve as the main or sole source of protein for rapidly growing infants and children at least for short period of time. It is expected that these studies will be continued, as well as research on the recent finding that hair root analysis for protein content is a simple, sensitive, and clinically useful means of determining the degree of protein malnutrition. This new procedure is more objective than estimate of hair root diameter, which may vary for several reasons; in fact, low hair root protein values were often found in malnourished patients with deceptively normal ranges of serum protein levels.

Research supported in large part through the U.S.-Japan Cooperative Medical Science Program has added important new knowledge regarding severe protein calorie malnutrition (marasmus and Kwashiorkor), the carefully controlled metabolic procedures required to effectively treat malnourished infants and children; interrelationships between nutrition and infectious diseases; nutritional anemias; use of low-cost food supplements in developing countries; occurrence of toxic aflatoxins in foods; and methods for genetic improvement of protein quality and content of cereal grains.

The dietary treatment of gastrointestinal diseases and other clinical disorders has been based, in large part, upon empiricism and tradition. Recent emphasis on the unproved value, ineffectiveness and potential harm of many therapeutic diets reveals the deplorable gap between recent advances in scientifically based nutrition knowledge and diet therapy. Well planned research into the role of foods in gastrointestional disorders and the formation of meaningful, palatable, nutritionally adequate diets based upon sound nutritional knowledge will improve treatment of diseases of the digestive system, kidney, pancreas, and heart.

Obesity interferes with optimal health and longevity in over 20 per cent of adults in the U.S.A. It enhances emergence of frank diabetes in adults predisposed to the disease through inheritance. It aggravates cardiovascular disease and osteoarthritis and increases the liability to hypertension, atherosclerosis, hernia, and gallbladder disease in persons of all socio-economic levels and ethnic origins. Studies of intake of calories in excess of energy requirements as a cause of obesity should be augmented by research on the metabolic aberrations of lipid metabolism, morphogenesis of adipose tissue cells, psychogenic and other factors regulating appetite, endocrine dysfunctions, hereditary influences, specific effects of individual nutrients and of overall dietary variations, effect of periodicity of eating, evaluation of body composition, and the effects of gastrointestinal short-circuiting as a treatment.

Hematology

One of the most important stimuli in hematology research is the continuing need for defining the metabolic mechanism responsible for anemia, one of the most prevalent disorders of man. Hemoglobinopathies, mineral, hormone and enzyme deficiencies, hemolysis due to pathologic immune mechanisms, and drug sensitivity, the major etiologic entities involved in anemias, will all be under intensive investigation during the next fiscal year.

Hemoglobin variants of animals and man will continue to be elucidated and the exact structure and composition of their molecules will be defined. Drawing on this biochemical background, the structural-functional relationships of abnormal hemoglobins producing such human diseases as sickle cell anemia, thalassemia and other hereditary hemoglobinopathies will be studied.

A most promising treatment for sickle cell anemia will be further explored by Institute grantees during the coming year. The method, so far tried in a limited number of patients, consists of intravenous injections of high concentrations of urea in invert sugar. Preliminary findings indicate the injections block and reverse the sickling of cells, resulting in rapid abortion of acute sickling crises. The treatment is based on the pioneering work of an Institute scientist, whose study is covered in the intramural Laboratory and Clinical Research portion of this document.

Two other noteworthy findings reported during the past fiscal year will be pursued further during this coming year. One involves the effects of aspirin on bleeding time in hemophilia. In previous research, grantee investigators had shown that the mean bleeding time of five minutes in normal subjects is prolonged to 9-1/2 minutes after ingestion of aspirin. This study now has been extended to patients with the clotting disorders hemophilia A and B, PTA deficiency ("Factor XI deficiency") and von Willebrand's disease, and it has been shown that moderate doses of aspirin may considerably lengthen the bleeding time of patients with severe hemophilia A and B. Further study will be required to learn why responses to aspirin vary from normal to excessive bleeding times in patients with severe hemophilia. The chief implication of the study is the potential therapeutic hazard which aspirin may hold for some patients with major blood clotting disorders.

Another grantee has provided new information concerning the production of antihemophilic factor by the spleen. Two years ago an Institute grantee had produced abundant quantities of anti-hemophilic factor (AHF) by perfusing pig spleens with human hemophilic blood. Subsequently, he reported preliminary success in "curing" true canine hemophilia A through transplantation, into these dogs, of spleens from normal dogs. Despite these successes, controversy still existed as to whether the spleen actually synthesizes, or merely stores, AHF. The present grantee has now shown conclusively that the normal spleen is a source of de novo synthesis of AHF. These results indicate that transplantation of normal spleens into patients with hemophilia should be given further consideration as a possible method of re-establishment of AHF synthesis in the patient, and, consequently, as a cure effective for as long as the transplanted organ remains functional.

New information concerning the regulation of the production of white blood cells has been obtained and should add to the general concepts of the control of all cell production. A substance has been isolated by a grantee from incubated human blood cells that has been found to stimulate bone marrow cells grown in culture to produce different cell types. This substance could have therapeutic value in serving as an important regulatory mechanism in various disorders of blood cell growth.

Since the characterization of hemoglobin S led to its implication as the genetic cause of sickle cell disease, little real progress has been made in finding a cure for the disease. Supportive therapy has improved considerably as medical techniques have developed. Use of antibiotics, blood transfusions and the improved general level of care have played their part but as with many diseases of an inherited cause a direct attack on the aberrant genes has not been possible. A research project currently supported by the Institute through studies showing that fetal hemoglobin appears to protect the red cell from the sickling effects of hemoglobin S, could provide the necessary steps to genetic management of not only sickle cell disease but other genetic blood diseases as well.

Environmental problems affect the general level of health and present new and challenging diagnostic problems to medicine. The development of a new, sensitive screening test for lead poisoning has been developed by a grantee as an outgrowth of work on the metabolism of abnormal red cells. Utilizing measurements of the enzyme aminolevulinic acid dehydratase (ALA-D), a versatile test for lead that promises to be of value in measuring copper levels (apparently increased in women taking birth control pills) and mercury levels as well, has been developed.

Dermatology

Diseases of the skin are not limited to disorders that are merely unsightly or disfiguring. Many diseases of the integument are of a considerably more serious nature; they can be chronically disabling as in allergic hand eczema seen in the home and throughout industry; they may become life threatening and some like pemphigus vulgaris and malignant melanoma are generally fatal.

Dermatologic research is no longer of an empirical nature. In response to a developing medical specialty that is manifesting expanded and more sophisticated research activities, Institute-supported research in dermatology has been focused upon further elucidation of basic cutaneous metabolism and function. It is thus designed to gain better insight into the underlying causes of various skin diseases. As a result of support of studies of basic mechanisms of disease, investigators have been able to place additional emphasis upon clinical studies, and a number of new approaches are emerging for the management of such chronic disorders as psoriasis, eczematoid dermatitis, acne and pemphigus vulgaris.

Few diseases of the skin are more frustrating for both the patient and his physician than psoriasis, a disease estimated to affect more than four million Americans. Although the thickened, reddish patches of skin covered with multiple layers of white scales are not painful, the lesions are extremely disfiguring and can have a profound psychologic effect upon the afflicted individual. Although the etiology of psoriasis is unknown all information points to a too rapid epidermal growth as being the final tissue event that accounts for the major clinical expression of this disease, i.e. the formation of scales. All evidence suggests that adequate control of epidermal cell replication can satisfactorily control the cutaneous lesion.

In addition to basic studies in psoriasis, this coming year grantee scientists will study further the use of the potent cytotoxic drug, methotrexate, which is effective in treating psoriasis, to learn more about the suspected liver toxicity side effect of this agent. The effectiveness of methotrexate in intractable psoriasis however has stimulated the interest of grantees to seek methods to diminish or avoid the hepato-toxicity and other side effects of this drug. In response to the rapid expansion of both scientific and public interest in psoriasis, the Institute will support a workshop on psoriasis research in the fall of 1971 to hasten the interchange of information and new research ideas. Along with studies of the proliferative diseases of the skin, electron microscopic research of keratinizing tissues will include studies of the formation and fate of differentiation products of the epidermis. This will be done by autoradiographic studies of epidermis, and by means of a new technique developed by grantees for processing skin cultures for electron microscopic investigations.

Research Grants Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
1. Arthritis	$ 8,319,000	$ 8,575,000	+$256,000
2. Dermatology	1,910,000	1,969,000	+59,000
3. Diabetes	5,613,000	5,786,000	+173,000
4. Endocrinology	12,179,000	12,554,000	+375,000
5. Gastroenterology	9,516,000	9,810,000	+294,000
6. Hematology	6,782,000	7,072,000	+290,000
7. Metabolism	20,154,000	20,776,000	+622,000
8. Nutrition	5,657,000	5,800,000	+143,000
9. Orthopedics	3,602,000	3,713,000	+111,000
10. Urology and kidney diseases	7,928,000	8,173,000	+245,000
11. Subtotal 1/	81,660,000	84,228,000	+2,568,000
12. General research support grants	8,123,000	7,243,000	-880,000
13. Scientific evaluation and planning	20,000	20,000	---
14. Total obligations	89,803,000	91,491,000	+1,688,000

1/ Includes $1,380,000 in 1971 and $1,380,000 in 1972 budgeted for Categorical Clinical Research Centers.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting continuations	1,380	$55,442,000	1,311	$59,215,000	-69	+$3,773,000
2. Competing projects	410	16,572,000	340	16,799,000	-70	+227,000
3. New	238	7,478,000	172	6,284,000	-66	-1,194,000
4. Supplementals	(116)	788,000	(81)	550,000	(-35)	-238,000
5. Subtotal regular program	2,028	80,280,000	1,823	82,848,000	-205	+2,568,000
6. General research support grants		8,123,000		7,243,000		-880,000
7. Scientific evaluations		20,000		20,000		---
8. Categorical clinical research centers		1,380,000		1,380,000		---
9. Total research grants	2,028	89,803,000	1,823	91,491,000	-205	+1,688,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Fellowships....................	$5,740,000	$5,094,000	-$646,000

Fellowships continue to represent a critical instrument in the overall goal of the Institute in aiding the development of biomedical research personnel needed to support the many categorical areas of its responsibility. The various components of the Fellowships program serve to meet varied needs by supporting research training at different stages of career development, as well as individuals with a variety of doctoral backgrounds, M.D., Ph.D., or D.V.M.

The NIH postdoctoral fellowships provides support to individuals in clinical or basic science departments in virtually any institution found appropriate on review. The preponderance of postdoctoral fellowships in the Institute are awarded to post-Ph.D. individuals, typically to support their second research endeavors. Their thesis work for the Ph.D. provided the opportunity for their first research endeavor under the sponsorship of faculty members. This postdoctoral fellowship provides an opportunity allowing him a greater measure of choice of research direction and provides a key step in allowing his development into the independent investigator whose capabilities are so critical to institutions participating in both research and training in the various categorical fields of interest of this Institute. It also provides a means to attract young scientific personnel into these categorical fields themselves. The postdoctoral fellowship thus contributes to a balanced effort by attracting basic scientists to the categorical responsibilities of the Institute.

Special Fellowships are an instrument adapted to the needs of more senior personnel, complementing the Institute's postdoctoral and training grant programs. It has more flexible stipend arrangements and serves for extension of work begun under postdoctoral fellowship or training grant support, and sabbatical leave or "retooling" experience for established faculty members.

The Research Career Development Award (RCDA) supports individuals who have already passed the step of being selected for faculty membership at an institution of higher learning. It provides faculty support for the infrequent but significant young investigator who should be given special opportunity to develop his research potential while serving as a faculty member. This is a joint endeavor between the Institute and the institution at which the RCDA recipient is appointed which assures the candidate of the requisite protected time, appropriate working relationships, and the necessary facilities. Provision of support via this instrument provides the opportunity for developing investigators to reach their full potential within an environment that includes patient care service and teaching. Selection of awardees emphasizes the quality of research, the developmental plan, the institutional setting, and assures an effective role in American medicine for the ablest of emerging investigators.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting	186	$3,799,000	178	$3,854,000	-8	+$55,000
b. Competing	12	135,000	12	138,000	—	+3,000
2. Supplementals	—	---	--	---	—	---
3. New	145	1,806,000	90	1,102,000	-55	-704,000
4. Total fellowships	343	5,740,000	280	5,094,000	-63	-646,000

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Postdoctoral	107	$888,000	82	$697,000	-25	-$191,000
2. Special	93	1,076,000	72	881,000	-21	-195,000
3. Research career:						
a. Career	26	779,000	26	826,000	--	+47,000
b. Developmental	117	2,997,000	100	2,690,000	-17	-307,000
4. Total fellowships	343	5,740,000	280	5,094,000	-63	-646,000

Fellowships Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
1. Arthritis	$ 496,000	$ 440,000	-$56,000
2. Dermatology	155,000	138,000	-17,000
3. Diabetes	476,000	422,000	-54,000
4. Endocrinology	1,215,000	1,078,000	-137,000
5. Gastroenterology	591,000	525,000	-66,000
6. Hematology	766,000	680,000	-86,000
7. Metabolism	1,103,000	978,000	-125,000
8. Nutrition	324,000	287,000	-37,000
9. Orthopedics	60,000	54,000	-6,000
10. Urology	554,000	492,000	-62,000
11. Total obligations	5,740,000	5,094,000	-646,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Training Grants...............	$11,475,000	$11,475,000	--

The Institute's Training Grants Program, together with Fellowships, is evidence of its concern for the chronic shortage of qualified personnel in the fields of clinical investigation and research training. Aimed toward career development in investigation and teaching, the program is centered in the clinical departments of medical schools throughout the country. The Institute bears responsibility for arthritis, dermatology, diabetes, endocrinology, gastroenterology, hematology, metabolism, nutrition, orthopedics, urology and renal diseases, and related areas.

The Institute's training grants serve both post-Ph.D. and post-M.D. training, but are peculiarly suited to the latter in providing for research training that builds on and reinforces the trainees' clinical skills. Most commonly this support is for the first sustained participation in investigation by the trainee. The traineeship is typically the time at which choice of a specific field of medicine or surgery is made. It allows a ready transition from the physician's involvement in clinical training to a research training effort and often reflects much exposure and discussion between the applicant and the faculty under whom the trainee's research will be accomplished. This opportunity enables the physician to become thoroughly enmeshed in research which will challenge fully his imagination and capabilities and will lead him toward a definitive career choice. The trainee may function initially in the role of minor participation as "a pair of hands" in a team effort, then progress through various stages until he reaches the full potential of his development as a researcher capable of formulating clinical questions in basic terms and developing strategies for their solution.

Such training programs and the activities of the trainees organizationally are within departments that serve a very wide and important range of teaching and patient care service functions. This combination of varied involvement in research training in a wide variety of professional roles in differing institutions results in a very diversified yield that is sensitive to the changing national needs for research, teaching, and patient care. Training grants thus provide the opportunity for recent medical graduates to develop their potential as teachers and investigators on a "learning-by-doing" basis; preceptors can recruit and develop according to the needs of their disciplines and institutions; and the Institute complements detailed arrangements for individual training programs to fit with broader overall plans responsive to the needs of the categorical fields for which it has responsibility.

In summary, the Institute training and fellowships programs took their starting impetus from concern for manpower needs of the Institute research programs. Their manpower yield today spans a wide range of personnel presenting research experience as part of their qualifications. At a time of rapid change, these programs can and are responding to national research and health care needs.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting......	214	$9,130,000	195	$8,880,000	-19	-$250,000
b. Competing.........	34	1,581,000	40	1,886,000	+6	+305,000
2. Supplementals.........	(12)	233,000	(10)	210,000	(-2)	-23,000
3. New..................	16	471,000	14	439,000	-2	-32,000
4. Scientific evaluation.	(1)	60,000	(1)	60,000	—	---
5. Total training grants.	264	11,475,000	249	11,475,000	-15	---

Training Grants (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Graduate.............	264	$11,415,000	249	$11,415,000	-15	---
2. Scientific evaluation.	(1)	60,000	(1)	60,000	--	---
3. Total training grants.	264	11,475,000	249	11,475,000	-15	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	491	$8,326,000	491	$8,804,000	--	+$478,000
Other expenses..........	--	9,401,000	--	9,154,000	--	-247,000
Total............	491	17,727,000	491	17,958,000		+231,000

Introduction

The Institute bears responsibility for a broad array of chronic disabling diseases--a wider, more diversified range of illnesses than covered by any of the other Institutes of the National Institutes of Health. Research activities, in addition to studies of the various arthritic diseases, include the study of a broad spectrum of heredity-linked metabolic diseases such as diabetes and cystic fibrosis, gastroenterology, hematology, endocrine disorders and mineral metabolism. Underlying these clinical studies is extensive fundamental research in biochemistry, pathology, histochemistry, chemistry, physical, chemical and molecular biology, nutrition, pharmacology, and toxicology.

The major objectives of the Institute's intramural program are to develop more complete information about fundamental chemical and physiological mechanisms on a cellular level as well as in the organism as a whole, and to employ such knowledge to discover the mechanism by which diseases develop. Of equal importance are studies to discover improved methods of therapy and prevention of disease.

A clinical research unit attached to the new Phoenix Indian Medical Center of the Indian Health Service has been activated. This unit has space for 25 beds, a metabolic kitchen, 5 laboratories, and the necessary supporting facilities. The unit will conduct clinical studies on a wide variety of diseases in the American Indian and Eskimo populations served by the Indian Health Service. Special emphasis will be given initially to gallbladder disease and diabetes where the particular population under study provides promising opportunities because of the high prevalence of these disorders among the Indians.

Arthritis and Rheumatism

Arthritis and rheumatoid diseases, such as rheumatoid arthritis, osteoarthritis, and gout, afflict more than 16 million people in the United States and are estimated to affect adversely the economy by nearly $4 billion annually. Arthritis specialists have divided the arthritic and rheumatic diseases into a dozen major categories. Each disorder is a distinct clinical entity, but all have in common similar symptoms, principally pain, swelling, disability or deformity in the joints or surrounding tissue.

In rheumatoid arthritis, the most cripping and painful form of arthritis, Institute investigators are studying a possible infectious process in this disease. Mycoplasma from swine with arthritis will be further examined to determine how this infectious agent may induce pathological changes in joint tissues. In the treatment of rheumatoid arthritis, this coming year intramural investigators will continue to scrutinize closely an anti-cancer agent, cyclophosphamide. Although preliminary results have been promising, scientists are anxious to learn more about the mechanism of action of the drug and how to deal with its potent side effects which may place limitations on its more widespread use.

Systemic lupus erythematosus is a grave, generalized disease which is manifested by structural and functional changes in the skin, joints, and internal organs. Young women are most frequently affected, and the disease is found most often in the 20-40 year age group. Although the cause of SLE is not known, much evidence points, as in the case of rheumatoid arthritis, to a disorder of the body's immune mechanism which may or may not be tied to a previous infectious process. A strain of mice in whom an autoimmune disease (quite similar to lupus erythematosus in man) is genetically acquired will be employed by Institute investigators to study the mechanisms of tissue destruction characteristic of human SLE. The researchers have been able to induce massive production of destructive isoantibodies in the mice and to suppress this production capability with powerful drugs. More work will be required to determine whether this work is applicable to control of human diseases of an autoimmune nature.

Other studies in arthritic disorders during the forthcoming fiscal year will range from molecular phenomena to the natural history of human disease or animal models of human disease.

Diabetes and Other Metabolic Diseases

Diabetes has the dubious distinction of being the best known metabolic disease, of ranking seventh in the list of diseases causing death in the United States, and of affecting currently more than four million Americans, with an additional five million or more individuals now living who will develop the disease during their lifetime. The most obvious defect in diabetes is the body's inability to utilize carbohydrates normally for energy expenditure and storage. A primary goal in Institute diabetes research is understanding the basic impairment of insulin activity, a complete knowledge of which would uncover some of the riddles now surrounding diabetes. Studies during the forthcoming year will center on the physiology of insulin, and how this hormone exerts its influence on cell membranes.

Cystic fibrosis is a grave disease of children and young adults caused by an inborn error of metabolism. The basic chemical defect is not yet fully understood, but it is known to be genetically transmitted. Estimates of the incidence of cystic fibrosis in the population today range as high as 1 in 1,400 live births. As a cause of death in children under 15 years, cystic fibrosis outranks many of the better known diseases such as poliomyelitis, rheumatic fever, and diabetes, and now that it is being diagnosed with increasing frequency throughout the world, it is recognized as a serious public health problem.

Institute researchers will continue clinical studies of this disorder, with additional basic studies in such disciplines as biochemistry, genetics, and molecular biology. Efforts will be geared toward uncovering the specific basic biochemical aberrations of this disease in expectation that in this way improved detection, control and therapy will result. For example, since the components of external secretions play such important roles in the pathogenesis of cystic fibrosis, intensive studies will be conducted to isolate the abnormal factors in such exocrine gland secretions as saliva.

Calcium concentration in saliva also is known to be abnormally high in cystic fibrosis patients, suggesting a defect in calcium metabolism. Little is known, however, about the mechanisms of calcium transport into salivary glands or the manner in which it is stored. Institute scientists will undertake new studies to understand better the role of the autonomic nervous system in normal salivary gland secretion mechanisms. These studies may define the mechanisms that are distorted in cystic fibrosis.

Endocrinology

Endocrine disorders, such as hyper-and hypothyroidism, growth retardation and osteoporosis, are known to strike many Americans. One main thrust in endocrinology is to learn the precise mechanisms by which hormones influence metabolism. Recent findings are leading to a better understanding of disorders of the parathyroid gland, such as hyperparathyroidism. This disease, marked by an oversecretion of the parathyroid hormone, causes decalcification of bone, an abnormally high blood calcium level and can lead to kidney stones, bone cysts, and other problems. Institute scientists have resolved an argument going on for many years as to whether the major effect of parathyroid hormone is on the kidney or on bone. They have found that the hormone activates the enzyme adenyl cyclase in both bone and kidney target cells and the resulting increased formation of cyclic adenosine monophosphate is responsible for both renal and skeletal effects. This potent substance is found in many tissues and appears to be the agent that mediates many hormonal effects. Furthermore, they have found that the newly synthesized 34 amino acid fragment is active in both kidney and bone. Up until now, pure parathyroid hormone has been in short supply and availability of the synthetic product will be useful in further studies in basic research and possibly clinically as well. Indeed it might be possible to synthesize a parathyroid hormone congener more active than the natural product.

In more clinically-directed research, Institute scientists will pursue their preliminary findings regarding the administration of thyroxine. The scientists have shown that weekly administration of thyroxine, a synthetic thyroid hormone, is a safe and effective means of controlling hypothyroidism in young patients without cardiovascular disease.

Prior to this discovery, it had been generally accepted that treatment of hypothyroidism required replacement of thyroid hormone in daily amounts adequate for maintaining normal metabolism. With the knowledge that some hypothyroid patients neglect to take their medication regularly, and that a single large dose of thyroxine has no untoward effects, the Institute clinicians had explored the possibility of managing hypothyroidism through once-a-week administration of thyroxine. Results of two important thyroid function tests were comparable in patients on the daily and weekly thyroxine regimens. All patients showed complete suppression of radioactive iodine uptake by the thyroid gland one week after the single dose of thyroxine. All patients remained symptom free during the one to three month period on weekly thyroxine therapy, the medication was well tolerated, and several patients expressed a preference for the intermittent therapy.

Among other planned endocrine research by the Institute, studies will be continued of the pituitary, thyroid, parathyroid and adrenal glands, their respective hormones, and the roles they play in the normal and abnormal physiology of the body.

Gastroenterology

There are numerous diseases of the gastrointestinal tract and its associated organs about which much remains to be learned, including diseases of the liver, gallbladder and pancreas. The diversity and magnitude of gastrointestinal disorders combine to place these diseases in a high position among the chronic afflictions affecting man.

The newly-established Digestive and Hereditary Diseases Branch will continue to conduct clinical and laboratory investigations to determine abnormalities in structure and function of the esophagus, stomach, small and large intestines, pancreas and liver, and research on certain hereditary metabolic diseases.

Work will be directed at an understanding of human disease and its treatment in terms of underlying derangements in the body's chemistry. Because the digestive tract lends itself particularly well to the pursuit of this goal and permits a ready extension of animal studies into man, this organ system is a primary focus of the Institute's clinical activities. In addition, since the inborn errors of metabolism constitute a direct clinical reflection of a chemical derangement, and since the inborn errors frequently affect segments of the digestive system, the Institute is also engaged in studies of such disorders.

Hematology

Hematology represents an important part of the Institute's research. The sum total of Americans afflicted with the killing and disabling disorders of the blood, excluding heart and vascular disease and circulatory problems, but including the anemias, sickle cell disease, and blood clotting disorders such as hemophilia, is considerable, being estimated at more than one million cases in this country. Among Institute research goals is a definition of the specific defects in the various blood disorders, as well as knowledge of the precise steps in normal and abnormal blood clotting mechanisms, with application of resulting findings to improved diagnosis and therapy.

In hemophilia research, Institute hematologists have been studying the role of Factor VIII (one of the blood coagulation factors) in the treatment and prevention of the hemorrhages that occur in hemophilic patients. It is known that spontaneous bleeding episodes and hemorrhages following surgery or trauma in patients with hemophilia can be treated readily with the potent Factor VIII concentrates now available. Little is known, however, about long-term prophylactic therapy to prevent recurrence of bleeding episodes. Now, however, Institute scientists have reported that prophylactic treatment of four hemophilic patients for as long as two years with Factor VIII-rich cryoprecipitate was found to decrease significantly the number of spontaneous hemorrhages. Further work is planned of this prophylactic regimen.

The basic research of an Institute scientist has provided clinicians with a possible new treatment for sickle cell anemia. This disorder is a major health problem for Negroes, occurring in about one in 500 births. Thus, for the Negro population, it is more common than the better known hereditary diseases such as phenylketonuria or cystic fibrosis.

Grantee investigators devised the first specific test to detect both homozygous and heterozygous hemoglobin S (the abnormal erythrocyte sickling component), which subsequently provided the key to the new therapy. The test was based on the observation of the Institute scientist that reduced hemoglobin S systems have a negative temperature coefficient of aggregation, due to the presence of abnormal hydrophobic bonds. The scientist had demonstrated that under conditions of lowered oxygen tension, bonding occurs between alpha and beta hemoglobin chains in sickling-prone erythrocytes. The resultant bound chains aggregate in the form of erythrocyte-deforming, elongated rods. He also showed that cooling weakens the hydrophobic bonds and tends to counteract sickling and speculated that other physical or chemical mechanisms which break abnormal hydrophobic bonds could provide the basis for national therapeutic innovations.

Correspondingly, clinicians at the Blodgett Memorial Hospital in Grand Rapids, Michigan, aimed their therapeutic strategy at in vivo attack on the abnormal hydrophobic bonds. Urea was used since it was recently recognized as capable of breaking hydrophobic bonds, and, in conjunction with invert sugar, had already been proven non-toxic through other therapeutic uses in controlling cerebral edema. Additional research demonstrated, in vitro, that urea dissolved in invert sugar solution desickled sickled erythrocytes and prevented further bond formation in susceptible cells. This new treatment is reported to have aborted the sickle cell crises in patients in severe pain who received urea in invert sugar intravenously, but further studies are needed to confirm these observations.

The net increase of $231,000 includes a decrease of $257,000 for non-recurring building renovations in 1971, offset by increases of $299,000 for annualization of the 1971 pay increase, $135,000 for within-grade pay increases, $31,000 for one extra day of pay in 1972, $10,000 for increased costs in 1972 of using the Federal Telecommunications System, and $113,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	21	$334,000	21	$354,000	--	+$20,000
Other expenses..........	--	5,619,000		5,123,000	--	-496,000
Total............	21	5,953,000	21	5,477,000	--	-476,000

The mission of the Institute and the versatile role it must play in pursuit of its goals has evolved other programmatic modes of approach to problems which fall within its province of responsibility. When the need becomes evident for a major new development, such as new organ preservation techniques or new, effective drugs to counteract the body's rejection barrier, it is usually impractical and inefficient to reassign to new directions intramural scientists who have specialized and are engaged in an ongoing orderly and productive research program. It is likewise seldom that competent and high caliber outside scientists will be willing to drop their studies of long standing in favor of a new problem which has become of special programmatic interest to the Institute. In attempting to meet special needs, then, where the kind and content of the work required is clear, direct collaboration is sought with special scientific talent or resources, usually already engaged and competent in closely related efforts and techniques, to further the accomplishment of the specific goal. Thus a third type of Institute activity has evolved through the years which encompasses features borrowed both from the extramural and intramural research approach, which is financed by direct operations funds of the Institute in contrast to extramural funds, and which makes use of the contract mechanism to finance its activities; this is the "collaborative" approach to attainment of Institute goals.

Artificial Kidney Program

In the United States today an estimated 55,000 individuals die each year as a result of irreversible kidney failure. The diseases which originally initiate the chain of events which terminates with advanced kidney failure vary considerably in nature. They may be primary kidney diseases like glomerulonephritis. In other instances progressive kidney damage may be induced by long-standing high blood pressure or diabetes, or kidney infection, and kidney damage may be initiated by obstructions such as kidney stones or hypertrophy of the prostate in aged males. Regardless of the original disease, serious progressive kidney damage leads to a common final pathway, end-stage kidney disease, followed by fatal irreversible kidney failure. It was estimated, based on recent experience, that about 7,500 patients of the yearly 55,000 individuals with end-stage kidney disease would possess the necessary medical and psychological prerequisites necessary for successful long-term dialysis treatment.

The problem of perpetual maintenance of patients with artificial kidneys is complicated by the fact that the cost of currently available techniques is too high, both in terms of money and qualified manpower, to permit widespread patient treatment. Also, patients maintained with the aid of artificial kidneys continue to display a number of undesirable symptoms related either to the underlying disease or to the treatment.

The artificial kidney will not be discarded. Many chronically uremic patients are not medically or psychologically suitable candidates for transplantation. Furthermore, patients who are suitable candidates will have to be sustained with an artificial kidney until they are well enough to have a transplantation operation and until a suitable, antigenically matching donor kidney can be found for them. Also they may have to be placed on an artificial kidney after transplantation if the donated kidney does not function properly for a time or is rejected.

Activities

At present about 65 carefully selected research and development projects are in existence, financed by contract funds. These contracts were placed with universities, nonprofit research laboratories and industrial concerns, and constitute a broad-spectrum approach to the problems of highest priority. Several projects each are focused on the problem areas mentioned above and to related investigations which promise to make the treatment of end-stage kidney disease less expensive and more effective, including development of special adsorbents for uremic toxins, evaluation of special protein-restricted diets in the maintenance of uremic patients to reduce the frequency of dialysis treatments required, and the maintenance of a national registry of all patients who are currently being maintained with the aid of dialysis.

Accomplishments

Among recent achievements is the development of a new generation of compact artificial kidneys, the so-called "hollow fiber dialyzers." The first of these has been started in commercial production after having proven extremely effective and relatively simple and inexpensive in trial use. Similar compact dialyzers of slightly different design are in the process of development.

Another innovation is the presterilized, disposable "envelope kidney" that saves many hours of preparation time in home dialysis. Developed for use with the conventional Kiil artificial kidney machine, the envelope kidney is essentially a presterilized sealed sandwich of Cuprophan PT-150 membranes supported externally by a fiber screen. The envelope is pre-tested for leaks, and blood ports for attachment to the patient's circulation are included within the sealed package.

Preliminary clinical results from trials of the envelope kidney have been excellent, with no adverse reactions, and with blood purification performance as good as or better than with standard membranes in the Kiil apparatus. At this point, no road blocks are foreseen to commercial production and routine use of the envelope kidney.

Another contractor has shown in preliminary investigations that dihydrotachysterol arrests the hyperparathyroid bone disease that characteristically accompanies chronic kidney failure and chronic hemodialysis. Hyperparathyroid bone disease, manifested by hypercalcemia, calcification of soft tissue, and decalcification of bone, is a well-recognized accompaniment of renal failure and chronic hemodialysis. Although the condition usually responds to parathyroidectomy, it has been difficult to manage medically because uremic patients characteristically develop vitamin D resistance with attendant impaired intestinal calcium absorption.

Dihydrotachysterol, a compound structurally similar to vitamin D, but differing markedly in its biological action, now has been found capable of arresting the hyperparathyroid bone disease seen in patients on long-term dialysis. Marked improvement was observed in all six patients treated in preliminary studies, suggesting that remission of such bone disease is possible by medical means without resort to parathyroidectomy.

Future Activities of the Artificial Kidney Program

The Program will continue all promising current research and development efforts and will pursue any new ideas and approaches which appear feasible. The Institute is currently funding a number of studies aimed at isolation and identification of unknown toxic factors which must be removed from the patients' blood, in addition to metabolic wastes and other substances known to accumulate during kidney failure, such as urea, creatinine, uric acid, potassium, hydrogen ion, and water. In this regard the program is actively pursuing the lead of the origins and effects of guanidinosuccinic acidemia and of methylguanidine in uremia. Studies, supported by this program, have shown that both substances are elevated in uremics, and have a pathophysiologic correlate to uremic symptoms. Searches will also be pursued for other toxicants possibly involved in the uremic syndrome. Much of the future success in simplifying the treatment of patients with end-stage kidney disease depends on developments in these areas. The Program also intends to follow very closely clinical and technological developments abroad and, when promising, to enlarge upon them for the benefit of United States patients as well. This is particularly pertinent since developments in several Western European countries have been quite promising, and their early and active introduction in the United States, and possible refinement, (without waiting for the usual delay connected with spontaneous spread of new techniques) could prove highly beneficial to patients in the United States.

Hormone Developmental Research Program

In recent years, gradually increasing knowledge has revealed the intricate regulatory relationship between hormones and enzymes in most biochemical processes. Alteration of this relationship undoubtedly underlies the functional derangement in many diseases of the blood, bone, liver and intestinal tract. There are numerous examples of areas in protein hormone research which if stimulated and strengthened by direct, concerted efforts would yield valuable results directly applicable to diagnosis and patient care in addition to filling gaps in fundamental and clinical endocrine research. At present, pending future expansion, the Institute's hormone developmental research program is comprised of three contracts.

Program Plan for 1971 and 1972

Current Activities: The Institute has contracted for the operation of the National Pituitary Agency to increase and improve the collection of human pituitary glands and to provide for the distribution of purified HGH to qualified research scientists. The NPA contract provides for the collection of human pituitary glands, fractionation of their major hormones, and distribution of HGH and other pure fractions to selected investigators for research purposes. At present, HGH can only be administered to patients in conjunction with clinical research studies because it is impossible to collect enough human pituitary glands to obtain sufficient HGH for treatment for all of the children suffering from hypopituitary dwarfism in the United States.

Another contract provides access for American investigators to the Steroid Reference Collection of the British Medical Research Council. This collection which includes literally hundreds of reference samples of steroids of highest purity is the only resource of this kind in the world. Investigators in the United States, including grantees of the Institute, require access to such a collection to facilitate and expedite their research since there is no counterpart in the United States to many of these standards.

The other project in this program provides for the collection of rat pituitary glands on a large scale and for their extraction and fractionation to yield purified standardized pituitary hormones: growth hormone, lactogenic hormone, follicle stimulating hormone, and luteinizing hormone. These purified hormones are being made available to qualified, interested investigators with the aid of a specially constituted group of outside scientific consultants. This project which had been strongly endorsed by investigators in endocrinology provides a much needed source of purified pituitary hormones for bioassy and chemical studies which have been held back to date for lack of the purified hormone fractions.

Scientific Communications

A continuing problem confronting individual physicians and research scientists today is the difficulty of keeping up with rapidly developing fields of knowledge directly or indirectly related to their work. The Institute, through its Office of Scientific Communications, will continue to provide current-awareness ("alerting") publications and other similar materials in areas within its purview, conduct retrospective literature searches, initiate conferences and workshops and publish their proceedings in order to provide the widest possible dissemination of up-to-date research information. The Institute will also conduct other activities related to scientific communication, such as the production of a limited number of specialized motion pictures and development of thesauri in carefully selected areas where the state of knowledge is less than optimal.

The Institute issues, on a regular basis, five current-awareness publications in major disease areas important to its mission. Currently published on a monthly basis are: ARTHRITIS AND RHEUMATIC DISEASES ABSTRACTS, DIABETES LITERATURE INDEX, and GASTROENTEROLOGY ABSTRACTS AND CITATIONS. In addition, ENDOCRINOLOGY INDEX is published on a bimonthly basis, and ARTIFICIAL KIDNEY BIBLIOGRAPHY is being published on a quarterly basis.

Each of these publications covers the entire scientific literature related to the subject matter (diabetes, gastroenterology, etc.) from throughout the world regardless of the original language. The response to these publications by investigators and medical school staffs has been very enthusiastic, and their need and usefulness have been clearly documented.

The net decrease of $476,000 includes a program decrease in the Artificial Kidney Program of $500,000, offset by increases of $10,000 for annualization of the 1971 pay increase, $9,000 for within-grade pay increases, $1,000 for one extra day of pay in 1972, and $4,000 for payment to the National Institutes of Health management fund for centrally furnished services. The decrease of $500,000 in the Artificial Kidney Program will reduce the number of active contracts from approximately 65 in 1971 to 57 in 1972, a decrease of 8 contracts.

Biometry, Epidemiology and Field Studies

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	31	$365,000	31	$541,000	--	+$176,000
Other expenses..........	--	556,000	--	408,000	--	-148,000
Total.............	31	921,000	31	949,000	--	+28,000

Epidemiology, the study of population and disease, is recognized by medical scientists as indispensable to the advancement of biomedical knowledge. In essence it deals with the relationships of the various factors which determine the frequencies or distributions of a disease.

The Epidemiology and Field Studies Branch is presently conducting studies to aid in determining the etiology of diabetes mellitus, cholelithiasis, various arthritides, and goiter. A number of these studies have been undertaken in American Indian populations because the characteristics of some of these make them especially suitable for investigation by epidemiologic methods.

The Southwestern Field Studies Section is located in Phoenix, Arizona, in order to be in geographic proximity to a number of American Indian reservations, and, in particular to the Gila River Reservation, where baseline studies relating to diabetes mellitus, gallbladder disease, and arthritis are being conducted.

Program Plans

The Southwestern Field Studies Section initiated a long-term program in 1965 in which the development of manifestations of diabetes, arthritis, and gallbladder disease in selected population groups are being studied and evaluated. Various factors, including hereditary, environmental, dietary, and anthropological aspects that may have a bearing on the frequency and severity of these diseases are and will be investigated. Selected findings are being contrasted with similar studies performed on other populations with different characteristics or environments.

There is a continuing professional and collaborative liaison with the Institute's clinical research program at the new Phoenix Indian Medical Center, and staff members are engaged in studies on gallbladder disease and diabetes at that new research facility.

Diabetes Mellitus

Diabetes mellitus and its vascular complications have been shown to occur at least ten times as commonly among the Gila River Indians as in the United States population as a whole. As diabetes mellitus is a very significant cause of morbidity and mortality in the United States, a major effort is being made by the Southwestern Field Studies Section to gain a detailed understanding of the distribution of this disorder and its complications in the Gila River Indian Community.

Methods of genetic analysis to detect the simple patterns of inheritance, utilizing the bimodal distribution of the glucose tolerance levels, have been developed. The hypothesis that diabetes mellitus is inherited as a simple recessive trait will be tested, but at the present time inadequate numbers of family units have been examined in which the offspring are of sufficient age to have developed diabetes.

The study of the geographic distribution of diabetes among American Indian populations will also continue. Additional data from the Southwestern Field Studies Section and other investigators indicate that there is wide inter-tribal variation in the prevalence of the disease. Other ongoing studies of diabetes are designed to explore the nature and inter-relationships of carbohydrate intolerance to the renal, retinal, and non-specific vascular complications of diabetes in the Gila River Indians. It is hoped that an understanding of the variation and extent of such complications will be obtained which might lead to the development of methods of prophylaxis.

Gallbladder Disease

The Southwestern Field Studies Section has recently completed the second phase of a study on the prevalence of cholelithiasis on the Gila River Reservation. Following the demonstration of a high frequency of symptomatic gallstone disease two years ago, subjects without clinical evidence of the disease have been examined by cholecystogram. It has now been shown that asymptomatic cholelithiasis is extremely common, especially in young adult females. The study has shown that the majority of Pima Indian females develop cholelithiasis between the ages of twenty to thirty years. Hence, females within the 15-25 year age group are at very high risk of developing gallstones within a short time. The identification of such a group will enable a critical analysis of possible precipitating factors. The group is also one in which more detailed studies are indicated.

Rheumatoid Arthritis

The presence of rheumatoid factor is a characteristic of subjects with rheumatoid arthritis, yet in natural populations many subjects may be shown to have the factor, but have no overt evidence of arthritis. Gila River Indian subjects with "false positive" tests for rheumatoid factor and an age-sex matched control group have been serially examined to determine the incidence of arthritis in the two groups. A six-fold difference in the incidence of probable and definite rheumatoid arthritis has been shown, indicating that the presence of rheumatoid factor is of predictive value. This suggests that an understanding of the reasons for the development of rheumatoid factor may be a vital clue in determining the etiology of sero-positive rheumatoid arthritis. In an attempt to gain insight into this process, the distribution of rheumatoid factor and the search for related phenomena will be extended to all Gila River Indians aged five years and over.

Metabolic Diseases Epidemiology Unit

The Metabolic Diseases Epidemiology Unit has previously demonstrated that simple goiter occurred in areas with polluted water supplies and was not inevitably associated with a low iodine intake. Following these observations, efforts have been made to identify goitrogens in the environment, and, in particular, in polluted water, from areas with a high prevalence of goiter, using the rat as an experimental animal.

The influence of clostridium perfringens, an anaerobic bacterium found in soil and sewage, as an antithyroid substance has been examined, and under certain defined circumstances, this bacterium has been shown to produce an exotoxin with goitrogenic properties. Laboratory studies are being conducted on other bacteria which are common contaminants of polluted water and soil. It is hoped that these studies will lead to clarification of a hitherto not investigated, novel causative mechanism for endemic goiter, which does not involve the classical theory of dietary iodine deficiency, and which is amenable to control through environmental improvement.

The increase of $28,000 includes $15,000 for annualization of the 1971 pay increase, $7,000 for within-grade pay increases, $1,000 for one extra day of pay in 1972, and $5,000 for payment to the National Institute of Health management fund for centrally furnished services.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	63	$971,000	63	$1,061,000	--	+$90,000
Other expenses..........	--	1,439,000	--	1,511,000	--	+72,000
Total.............	63	2,410,000	63	2,572,000	--	+162,000

This activity involves professional and supporting personnel who are responsible for the administration of the Institute's several grants activities. They assist in the planning and development of programs in research, training, and fellowships that will best serve to accomplish the desired results in the areas of disease interest for which this Institute is responsible; review and evaluation of research and training grant applications for presentation to the National Advisory Arthritis Council; required Council staff assistance; liaison with applicants, grantees, other components of NIH and the Department, advisory bodies, and interested organizations; continuous surveillance of scientific activities and progress; and recording and reporting of fiscal and scientific information relevant to all transactions.

The increase of $162,000 results from increases of $61,000 for annualization of the 1971 pay increase, $26,000 for within-grade pay increases, $3,000 for one extra day of pay in 1972 and $72,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	21	$313,000	21	$330,000	—	+$17,000
Other expenses.........	--	83,000	--	87,000	--	+4,000
Total............	21	396,000	21	417,000	—	+21,000

This activity is comprised of the Institute Director, his immediate staff and administrative management and service personnel who are responsible for the general direction, coordination and administration of the total Institute activities.

The increase of $21,000 includes $9,000 for annualization of the 1971 pay increase, $7,000 for within-grade pay increases, $1,000 for one extra day of pay in 1972, and $4,000 for payment to the National Institutes of Health management fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants (Public Health Service Act Title IV Part D)

1971 Amount	1972 Authorization	1972 Budget Estimate Amount
$89,803,000	Indefinite	$91,491,000

Purpose: This program provides support for clinical and basic research in an unusually broad spectrum of diseases and disciplines including arthritic, rheumatic, and collagen (connective tissue) diseases; various metabolic disorders, such as diabetes; gastrointestinal diseases, such as peptic ulcer; endocrine malfunctions; dermatological conditions, such as psoriasis; diseases of blood, bone, liver, and kidney; and research in urology, nutrition, and orthopedic surgery.

Explanation: Applications from individual investigators at educational and non-profit institutions are reviewed and ranked on the basis of the qualifications of the investigator and the merit of the proposed project by panels of outstanding experts in specific fields. Within the funds available, the Institute makes grant awards in the order of these priority scores.

Accomplishments in 1971: In 1971, an estimated 2,028 research projects will be supported at over 400 institutions throughout the nation. This represents about 35% of those applications approved by the panels of experts.

Objectives for 1972: The Institute will continue to attempt to maintain a balanced program across the broad areas of its responsibility. It is estimated that the funds to become available will support 1,823 research projects or 205 fewer than in 1971.

Activity: Fellowships (Public Health Service Act Title IV Part D)

1971	1972	1972
Amount	Authorization	Budget Estimate Amount
$5,740,000	Indefinite	$5,094,000

Purpose: The increasing complexity and specialization in biomedical research demand a highly skilled reserve of scientific manpower. To increase the number and effectiveness of individuals in research and related academic fields, the Institute will continue its three-pronged Fellowship program designed to develop the full investigative potential of the young scientific community. The program includes Special Fellowships, Postdoctoral Fellowships, and the Research Development Awards.

Explanation: Postdoctoral fellowships provide support directly to selected individuals and may be applied at clinical or basic science departments of any institution in the United States. This award may be directed toward a unique line of investigation and, as such, may provide the groundwork for future fields of research.

Placing emphasis on individuals with broader biomedical backgrounds, special fellowships are awarded, for the most part, to young men and women in advanced research and techniques training who have not yet established a permanent affiliation with an academic institution. However, recipients also include established investigators on leave from their positions to pursue special studies.

Young scientists who have displayed exceptional investigative ability in their postdoctoral training are candidates for the Research Development Award. Designed to develop full professional potential, the award provides salary support for a limited number of years to encourage careers in health-related independent research.

Accomplishments in 1971: It is estimated that in 1971, 343 fellowships will be supported in ten major fields for which this Institute is responsible.

Objectives for 1972: Approximately 280 fellowships will be supported. This is 63 fewer than in 1971 and results from a budget reduction of $464,000.

Activity: Training Grants (Public Health Service Act Title IV Part D)

1971	1972	1972
		Budget Estimate
Amount	Authorization	Amount
$11,475,000	Indefinite	$11,475,000

Purpose: The Institute's Training Grants Program is evidence of its concern for the chronic shortage of qualified personnel in the fields of clinical investigation and research training. Aimed toward career development in investigation and teaching, the program is centered in the clinical departments of medical schools throughout the country.

Explanation: Applications are submitted by and awards made to the directors of the training programs rather than to individual trainees. These grants provide for the support of the research environment within the department as well as for stipend support for trainees selected by the program director.

Accomplishments in 1971: During 1971 approximately 264 training grants with about 678 trainees will be supported.

Objectives for 1972: In 1972, funds expected to become available will support an estimated 249 training grants or 15 fewer than in 1971.

Activity: Laboratory and Clinical Research (Public Health Service Act Title IV Part D)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
491	$17,727,000	Indefinite	491	$17,958,000

Purpose: The National Institute of Arthritis and Metabolic Diseases bears responsibility for a broad array of diseases characterized by their chronicity and long-term disabling effects rather than mortality: various arthritic diseases and related rheumatic and connective tissue disorders; diabetes and other inherited errors of metabolism; diseases of the gastrointestinal tract, including diseases of the liver and gallbladder; endocrine disorders; and diseases of the blood and bone.

Explanation: The total intramural program necessarily includes studies of a fundamental nature as they are associated with the specific disease objectives described above. Thus, the Institute has an important stake in the pursuit or support of research in fundamental sciences which constitutes the foundation of knowledge pertinent to any of the above disease categories. The fundamental scientific disciplines include chemistry, biochemistry, enzymology, molecular biology, anatomy, histology, pathology, physiology, medicinal chemistry, pharmacology, and genetics.

Accomplishments in 1971: Significant gains were made in the field of endocrinology where the determination of the complete structure of the parathyroid hormone has been determined and has led to its successful synthesis. In the field of hematology, the so-called Australia antigen in the blood has been related to both serum and infectious hepatitis. A possible new treatment for sickle cell anemia has resulted from basic research studies by an Institute investigator.

Objectives for 1972: Projects underway in 1971 will be continued but no major new projects are planned. The program decrease of $357,000 includes reductions of $347,000 for non-recurring building renovations in 1971 and $10,000 in the Office of Information as part of a government-wide policy to reduce public relations activities.

Activity: Collaborative Research and Development (Public Health Service Act Title IV Part D)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
21	$5,953,000	Indefinite	21	$5,477,000

Purpose: This activity is designed to make use of the research and development contract as a mechanism to meet special needs where the kind and content of the work required is clear and direct collaboration is sought with specific scientific talent or resources to pursue specific goals. The use of research contracts permits a coordinated, focused, developmental effort to reduce the lag period between development of basic research information and its practical application to human welfare.

Explanation: Three separate programs are conducted within this activity. The Artificial Kidney Chronic Uremia Program is focused upon improvement of repeated hemodialysis for patients with permanently impaired kidney function and upon making this therapeutic modality less expensive and more effective. The Endocrine and Diabetes Hormone Developmental Program currently supports the collection, fractionation and distribution of rare, pure hormonal fractions to selected investigators for research purposes. The Scientific Communications Program provides current-awareness publications and other similar materials, conducts retrospective literature searches and initiates conferences and workshops and publishes their proceedings in order to provide up-to-date research information to individual physicians and research scientists.

Accomplishments in 1971: Among the achievements of the last year were the development of a new generation of compact artificial kidneys, the so-called "hollow fiber dialyzers". The first of these has been introduced into commercial production after having proven extremely effective and relatively simple and inexpensive in use. A new "envelope dialyzer" has been developed which decreases significantly the set-up time in home dialysis and eliminates the need for complicated sterilization of dialyzers by the patient. The new dialyzers have been very successful in clinical testing and will become available commercially in March 1971.

A new selfcontained automatic peritoneal dialysis system has been developed and has been tested clinically. This new system, which will permit hospital center or home peritoneal dialysis, will soon see commercial production.

Objectives for 1972: A decrease of $500,000 in the Artificial Kidney Program will reduce the number of active contracts from 65 in 1971 to 57 in 1972, a decrease of 8 contracts.

Activity: Biometry, Epidemiology, and Field Studies (Public Health Service Act Title IV Part D)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
31	$921,000	Indefinite	31	$949,000

Purpose: Epidemiology, the study of population and disease, is recognized by medical scientists as indispensable to the advancement of biomedical knowledge. In essence it deals with the relationships of the various factors which determine the frequencies or distributions of a disease.

Explanation: The Institute's Southwestern Field Studies Section, located in Phoenix, Arizona, initiated a long-term program in 1965 in which the development of manifestations of diabetes, arthritis, and gallbladder disease in selected population groups are being studied and evaluated. Various factors, including hereditary, environmental, dietary, and anthropological aspects that may have a bearing on the frequency and severity of these diseases will be investigated. Selected fundings are being contrasted with similar studies performed on other populations with different characteristics or environment.

Accomplishments in 1971: Intensive studies of the Pima Indians of the Gila River Reservation, who have been found by Institute investigators to have a diabetes incidence 10 to 15 times greater than that of the country in general, have now made possible a valid separation of individuals with high blood sugar levels into those truly diabetic or latent diabetic, and others in whom high blood sugar levels are merely an expression of attendant obesity. This is a major step forward in investigations of the genetic and all possible environmental factors which could determine the emergence of frank diabetes in such a population.

It has also been shown that the majority of Pima females develop gallstones before the age of 30. Thus, the 15- to 25-year age group can now be selected as a study group known to be at very high risk of developing gallstones within a relatively short time. This will permit a statistically valid critical analysis of factors precipitating gallstone formation--a disorder which affects literally millions of Americans.

Objectives for 1972: Epidemiological research on the conditions noted above will continue. Obesity and diabetes rates will be studied and compared among the Pimas and other Indian tribes in Arizona. Collaborative studies at the Institute's clinical research unit in Phoenix will be undertaken and will include gallbladder disease, diabetes, and digestive diseases.

Activity: Review and Approval of Grants (Public Health Service Act Title IV Part D)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
63	$2,410,000	Indefinite	63	$2,572,000

Purpose: This activity covers the centrally furnished services from the National Institutes of Health management fund and the direct costs of staff and outside advisors engaged in the administration of the Institute's several granting activities.

Explanation: The staff participates in the planning and development of programs in research, training, and fellowships that will best serve to accomplish the desired results in the areas of disease interest for which this Institute is responsible; reviews and evaluates research and training grant applications for presentation to the National Advisory Arthritis Council; furnishes required Council staff assistance; maintains liaison with applicants, grantees, other components of NIH and the Department, advisory bodies, and interested organizations, maintains continuous surveillance of scientific activities and progress; and records and reports fiscal and scientific information relevant to all transactions.

Accomplishments in 1971: During 1971 the staff reviewed approximately 3,301 grants for scientific merit and program relevance and maintained surveillance over 2,635 grants.

Objectives for 1972: In 1972, a continuing effort will be made to strengthen the liaison and surveillance activities in order to obtain maximum benefit from the available grant funds.

Activity: Program Direction (Public Health Service Act Title IV Part D)

1971			1972 Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
21	$396,000	Indefinite	21	$417,000

Purpose: This activity is comprised of the Institute Director, his immediate staff and administrative management and service personnel who are responsible for the general direction, coordination and administration of the total Institute activities.

NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

STATEMENT OF DR. EDWARD RALL, ACTING DIRECTOR

ACCOMPANIED BY W. GILBERT BAYLIS, EXECUTIVE OFFICER

INSTITUTE RESPONSIBILITIES

Senator COTTON (presiding). The committee will come to order.

We will listen to Dr. Rall, who is acting director of the National Institute of Arthritis and Metabolic Diseases.

Dr. RALL. Mr. Chairman, I appreciate this opportunity to tell you about the National Institute of Arthritis and Metabolic Diseases. This institute has the responsibility for an enormous array of diseases, including diabetes, which is eighth as the cause of death in the United States.

Arthritis afflicts on the order of 17 million U.S. citizens. Kidney diseases causes something of the order of 50,000 deaths a year. Gastrointestinal diseases afflict approximately 75 percent at one time or another throughout their life. Ten percent of the population have peptic ulcers or will have. Fifteen million Americans have gallstones. It is an enormous problem.

Let me give you a very brief progress report on a few of the research programs conducted this past year.

ADVANCES IN ARTHRITIS RESEARCH

First, the treatment of rheumatoid arthritis, a disabling usually not fatal disease. Cyclophosphamide is a potent chemical developed in the cancer chemotherapy program a dozen years or so ago and is still used in cancer chemotherapy. It is also an immunosuppressive drug.

Investigators in rheumatoid arthritis decided a few years ago as a result of a large number of studies over the last two decades which showed abnormalities in the immune process in rheumatoid arthritis that an immunosuppressive agent might have therapeutic value. The American Rheumatism Association in conjunction with this Institute organized a study on the use of cyclophosphamide in the treatment of arthritis. The results have shown this drug to be superior to any other tested in that particular study. There is no question but what it inhibited a progression of the disease as indicated by a variety of objective signs.

Cyclophosphamide, however, is a potentially dangerous drug. It surely is not the answer to rheumatoid arthritis, but it seems to us to provide an important lead, perhaps, toward the synthesis of related chemicals or chemicals with a similar physiologic function. We are quite hopeful that this will signal the introduction of new, different, and more effective therapies for rheumatoid arthritis.

You may have read about two other drugs used in this disease—histidine and penicillamine. They have been employed in relatively large doses and both show some promise in rheumatoid arthritis, although I think it is too early to be sure exactly what their role will be.

Senator COTTON. Who developed these? Did you or the drug companies?

Dr. Rall. My brother, Dr. David Rall, informs me that cyclophosphamide was developed by a German pharmaceutical company.

Histadine and penicillamine had been developed for other purposes many years ago.

INHERITED DISORDERS OF METABOLISM

This institute is also responsible for a large variety of metabolic diseases. Some of our researchers have utilized tissue culture techniques as a means of getting at the causes of certain of these diseases.

Cells from a patient's skin are grown in a test tube so that we may look at the cells and more easily discover what is wrong with them. Two of these diseases—Hurler's Disease and Hunter's Disease, which affects approximately one out of 5,000 births are inherited disorders of metabolism which usually cause death before the age of 20. Scientists in our own laboratories have found that normal cells in tissue culture secrete a protein which added to cells from patients with Hurler's Disease, cures them of their metabolic disorder. This same material can also be found in normal urine and we are currently tooling up to produce enough for a therapeutic trial in some children. In another study, an investigator has injected these children with normal serum because there is a very small amount of this protein in normal individuals, and has reported a favorable effect. We think this type of investigation into metabolic diseases by means of tissue culture techniques may be applicable to a large number of serious or fatal genetic diseases.

I could go on to report on the artificial kidney program and a variety of other program developments, but I think I had best stop with the comment that there is an exciting series of researches which we think show great promise in many of the diseases for which this Institute is responsible.

I will be happy to answer any questions that I can.

CLINICAL RESEARCH IN ARIZONA

Senator Cotton. I have some questions here that have been prepared by the chairman. Last year we directed that at least minimum staffing requirements be made available for the clinical research program on Indians in your new research unit at Phoenix Indian Medical Center. Was this directive carried out and what resources have been allocated?

Dr. Rall. Yes, sir. It was carried out and 24 positions were allocated. If I can give a little background, there is a new Indian Health Service hospital in Phoenix. Through arrangements with that Service some years ago we have one floor which consists of a 25-bed research ward plus the equivalent of about 10 or 12 large laboratories. We have as director of the unit, Dr. Scott Grundy, from Rockefeller University, a senior biochemist from Mayo Clinic, three younger clinical investigators, and a total staff of 17 on board at the present time. We have 21 patients in the unit. It is a going concern.

Our investigators there have already found some interesting things about the Indian with respect to gallstones. The Indian women under study have an extraordinarily high incidence of gallstones which reaches 80 percent by the time they are 35 years old, which is almost unheard of in the general population. A major difference in these patients is a decreased secretion of bile acid by the liver. We are hoping to confirm these preliminary data with some other studies at the clinical center in Bethesda.

Senator Boggs. Is that hard to diagnose?

Dr. Rall. Some of them are fairly easy, because you can give a dye which is concentrated in the gall bladder. Usually if there is a stone there, it shows up as a shadow in the X-ray.

Senator Boggs. I had a veteran's case I was working on. Nobody could diagnose what was happening to him, why he was sick. They finally cut his food and put some dye in his blood and discovered he had gallstones, and operated on him. They took stones out as big as marbles practically.

DIGESTIVE DISEASES

Senator Cotton. I understand that digestive diseases constitute a much more serious problem than is generally recognized. In fact, we are told that chronic digestive diseases affect almost 40 million Americans. Would it be desirable, given the magnitude of the problem, if substantially more funds were allocated for digestive disease research and training than has been allocated up until now?

Dr. Rall. I think I could say "Yes" to that.

Senator Cotton. Yes, if people would do what they are told. It is a matter of diet, is it not?

Dr. Rall. It is more than diet. In some instances it is diet, but in many instances we really don't know what the cause of the disease is. Under these circumstances sometimes you are fortunate in finding a cure without knowing the cause, but in general if you don't know the cause, it is much more difficult to find a cure.

I think there is no question in our mind but what the digestive diseases have not received the support that they really should have in view of the magnitude of the problem. We have made an effort by appointing an acting assistant director and in planning to reorganize the Institute.

Senator Cotton. You have that assistant director now?

Dr. Rall. We have an acting assistant director. We are hoping to get some more resources to reorganize the Institute to have a full-time assistant director for nutrition and digestive diseases. We are also trying to set up another research unit in Bethesda specifically directed to liver diseases.

SPECIAL REPORT ON DIGESTIVE DISEASES

In short, we feel it is an important area. We have a special report on digestive diseases which we will be happy to submit for the record, if you so desire.

Senator Magnuson. Yes, we would like to have it.

(The report follows:)

Special Report: Digestive Diseases

Peptic ulcer, regional iletitis, and diseases of the liver, gallbladder and pancreas—these are the numerous and diverse disorders which are traditionally included in the medical specialty of digestive diseases.

Although many ailments involving the gastrointestinal tract are poorly understood, they are among the most common illnesses in the country, ranking second only to diseases of the heart and circulation in the number of physician office visits or house calls. Peptic ulcer or peptic ulcer symptoms will strike about 10 percent of all adults in the United States at some time in their lives. Diseases of the stomach and intestines may afflict persons of any age, but most often affect those in the middle-aged groups at the peak of their most vigorous and productive periods, often causing prolonged and expensive hospitalization and countless social and emotional problems. Some diseases such as ulcerative colitis are of a chronic nature, patients being afflicted for years with their disorder and may have to under go extensive and repeated treatments and surgery.

The National Institute of Arthritis and Metabolic Diseases (NIAMD) bears the responsibility for the Government's program of research in the field of digestive diseases. In an effort to facilitate increased attention to research and training in the field of diseases of the digestive tract, as well as nutrition, an Assistant Director for Digestive Diseases and Nutrition has recently been designated for the Institute.

Similarly emphasizing the importance of digestive diseases in the Institute's program. a gradual expansion is planned for the intramural Digestive and Hereditary Diseases Branch in which Institute scientists conduct clinical and laboratory investigations to determine abnormalities in structure and function of the esophagus, stomach, small and large intestines, pancreas and liver, and research on certain hereditary metabolic diseases.

Through numerous grants to scientists at research centers across the country, a broad array of ailments of the digestive tract is undergoing investigation. Research progress has been achieved only through the most intensive and comprehensive laboratory experiments and clinical trials. The past year has seen the development of numerous important research findings, several of far-reaching importance.

RESEARCH DEVELOPMENTS [1]

Cholesterol gallstone formation

A new concept of how cholesterol gallstones (the most prevalent type) are formed has emerged from recent studies and will be confirmed in experimental work with the Pima Indians of Arizona in whom Institute scientists have found the highest incidence of gallstones ever reported in the United States. Recent experimental results indicate that the formation of cholesterol gallstones is probably due to secretion by the liver cells of bile abnormally high in cholesterol in which the latter exists in a highly supersaturated state so that it will later precipitate out in the gallbladder. This important finding, which points to the liver as the origin of the disease rather than to the gallbladder itself, channels research effort into a wholly new direction. Bile salts and lecithin are the primary solubilizing agents for cholesterol in bile. By supplying additional bile acids, the composition of the bile might be changed toward normal. The extensive understanding of cholesterol and lecithin metabolism gained through much research aimed at the problem of atherosclerosis during the last decade can now be utilized in this area in an attempt to find ways to modify the composition of bile in gallstone-prone individuals.

Heartburn research

Heartburn, caused by reflux of acid stomach contents into the esophagus, is one of the most frequent complaints of gastrointestinal origin. More severe forms of this phenomenon occur in esophagitis and hiatal hernia. Despite many published observations, how and why reflux occurs in these individuals and not in others, is largely unknown. Work performed by an Institute grantee is well along toward answering this question and, therefore, to offering some rational and effective. rather than merely empirical treatment of the condition. Studies by these investigators suggest that the important hormone gastrin, released by the stomach, is at least one factor which controls the baseline pressure of an important physiological structure, the lower esophageal sphincter, which normally acts as a one-way gateway between esophagus and stomach and which usually prevents stomach acid from flowing back into the esophagus. Patients who have frequent gastroesophageal reflux have lower baseline pressure in this structure than the normal group, perhaps because the sphincter is insufficiently responsive to gastrin or perhaps because insufficient gastrin is producted and released by the individual. If this conjecture proves to be correct, new avenues of rational therapy seem probable.

---

[1] Prepared February 1971 as background information for the Director, National Institute of Arthritis and Metabolic Diseases, Public Health Service, U.S. Department of Health, Education, and Welfare, in connection with the fiscal year 1972 appropriation hearings.

Gastrointestinal bleeding

Gastrointestinal bleeding, which particularly affects older people appears to be increasing in our population as the incidence of ulcers and intake of alcohol and aspirin increase. Diagnosis of the site of the bleeding is still difficult and, in a fair percentage of cases, uncertain. Barium meals, endoscopy and intubations each have their advocates and each is able to differentiate the bleeding site in a majority of cases. If, however, a more certain and less traumatic or complicated procedure could be developed it would be a major advance. One of the Institute grantees is working on a new approach to localizing the bleeding site which would be rapid and relatively innocuous for the patient. Methane or radio-active xenon gas, instilled into the colon, is absorbed first and in highest concentrations by the blood supply to that region (portal) and, therefore, if the bleeding is from esophageal varices, the concentration of the gas in samples of blood recovered from the stomach will be high; if from gastric bleeding sites, it would be low.

Gastrin studies

Several years ago, Institute grantees in England synthesized gastrin, a hormone which stimulates secretion of gastrice juice, and more recently another grantee showed that anti-gastrin antibodies produced in rabbits inhibited endogenous gastrin-mediated gastric acid secretion in rats. Since increased blood gastrin levels are correlated with gastroduodenal ulceration due to hypersecretion of gastric juice, this suggested the possibility of modifying through such novel approaches (development of immunologic antagonism to the hormone gastrin) excessive gastric acid secretion in disease states such as peptic ulcer.

Aonther grantee has shown that the hormone secretin prevented increased blood gastrin levels in animals and that subjects with duodenal ulcers secrete less secretin than do normal subjects in response to acid stimulation of the duodenum. This offers another possible approach (secretin supplementation) to attacking the ulcer problem through our recently much improved understanding of the basic physiological mechanisms involved.

A recently developed radioimmunoassay method, which enables one to measure minute amounts of gastrin, was applied by an Institute-supported grantee at the University of California, Los Angeles, to study the release and destination of this hormone. They determined that it is released into the bloodstream rapidly in response to food, and is significantly higher in the blood of duodenal ulcer patients than in normal subjects. For example, after a 1250-calorie liquid test meal the serum gastrin levels rose to an average peak of 148 picograms per ml. in normal subjects, and to 250 in ulcer patients.

Digestive diseases in older people

In order to help gauge the problem of digestive disease in the geriatric population, a team of Institute-supported investigators from the University of California School of Medicine, Irvine, California, and the Long Beach Veterans Administration Hospital, studied a total of 1600 patients who had either vagotomy with drainage procedure or some type of gastric resection for non-cancerous diseases of the upper gastrointestinal tract. Of these, 230 were over 60 years of age and 125 of them underwent surgery for bleeding. Ninety-one of the 125 had duodenal ulcers, 27 had gastric ulcers, four had gastritis, two had esophageal ulcers, and one had esophagitis.

The ratio of three duodenal ulcers to one gastric ulcer is similar to that found in younger patients, the investigators reported. The overall mortality rate of 21 percent in bleeding peptic ulcer indicates that this disease is a severe life-threatening situation. Survival, rather than long-term effects of the surgery, becomes more important and thus more radical surgical intervention seems indicated than has been conventionally deemed desirable in older patients. According to the investigators, the high mortality in this group of over-60 patients is related to the amount of bleeding, especially when there is a loss of over 2500 ml., and related to age, particularly among those over 75 years.

The stomach in PXE

Pseudoxanthoma elasticum (PXE) is a rare connective-tissue disorder which is inherited as an autosomal recessive trait. Five patients with PXE who had a history of upper-gastrointestinal tract bleeding were studied in order to determine if there are local gastric factors which might lead to hemorrhage. They were examined with a gastroscope at a time when they had not bled for at least one year. All five patients had linear or nodular, raised, submucosal lesions which were yellow in color and similar to the xanthomalike skin lesions seen in this disease. In addition, two patients had moderately severe gastritis.

In view of the high incidence of gastrointestinal bleeding and a presumed defect in the vascular component of clotting in this disease, the Institute supported researchers at Johns Hopkins Hospital suggest that all patients with PXE be examined by gastroscopy and treated intensively with antacids if gastritis exists.

Alcohol delays gastric emptying

The results of animal studies indicate quite consistently that alcohol interferes with gastric movement and evacuation. Alcohol was reported to reduce hunger contractions of the stomach in dogs, and to delay gastric emptying of glucose, fat and protein meals in the rat. The data obtained from human subjects are less consistent, and both interference with the emptying process and lack of any effect have been reported.

Institute-supported researchers at the Wood Veterans Administration Center and Marquette University School of Medicine investigated the problem of the gastric activity-alcohol relationship in an everyday situation: the effect of alcohol before dinner on the gastric emptying of a subsequent meal. A recently developed method, using radioactive chromium as a meal marker and external counting of radioactivity, was employed to measure the rate of gastric evacuation. It was found that ingestion of 4 oz. of whiskey delayed the gastric emptying of a subsequent meal by an average of 99 minutes.

Celiac disease

Celiac disease ("nontropical sprue") is characterized by fatty diarrhea, intestinal malabsorption, and dietary deficiency symptoms, all caused by an intestinal sensitivity to a polypeptide fraction (gliadin) of the cereal protein, gluten, in the diet.

An Institute-supported grantee at the University of Colorado Medical Center has recently reported that clinical findings of gluten-induced intestinal diseases are highly variable. Other coexisting disorders may cause malabsorption and can obscure and delay diagnosis and treatment.

The classic features of adult celiac disease were present in only eight of twenty-one patients studied from 1961–68. Individual case histories revealed that nearly all the patients demonstrated *some* of the classical features of malabsorption, but mild and nonspecific gastrointestinal symptoms were misleading in some cases, and in others, secondary nutritional manifestations predominated. Since coexisting alternative explanations for malabsorption, including diabetes and gastric surgery, may obscure the diagnosis, a complete evaluation is necessary, the investigators reported.

Strict adherence to a gluten-free diet resulted in dramatic clinical, chemical and histologic improvement in some patients, although recovery sometimes required many months. Other patients were able to discontinue the diet without apparent adverse effects, confirming the work of other investigators.

Inflammatory bowel disease

The causative factors of inflammatory bowel diseases such as ulcerative colitis and Crohn's disease are still unknown. From research carried on by several Institute grantees, however, immunological mechanisms seem to be strongly indicated. Thus, it has recently been reported that acute exacerbations of Crohn's disease responded favorably to systemic treatment of the patient with immunosuppressive agents. In other studies, granulomatous lesions (resembling the characteristic lesions of Crohn's disease) have been induced experimentally in animals by injecting small intestine and lymph node tissue homogenates from patients with Crohn's disease. These results point to the possibility of a transmissible agent in Crohn's disease. Further work is required to identify the nature of this agent and to provide a rational therapy for this disease based on this new hypothesis.

Therapy after gastrointestinal surgery

Other grant-supported investigators are studying new therapies to ameliorate the untoward after effects which sometimes occur as the result of extensive gastrointestinal surgery. For example, studies are continuing on the possible effectiveness of medium-chain triglycerides (special man-made fats which contain fatty acid chains considerably shorter than those ordinarily found in natural oils and fats) for patients with the "short bowel syndrome."

Massive resection of the small bowel for inflamamtory bowel disease, or for other reasons, can create serious therapeutic problems. Typically, patients with a resultant "short bowel syndrome" develop severe diarrhea and lose excessive and, in some cases, life-threatening amounts of water and essential electrolytes in their stools. No form of therapy has been completely satisfactory, until a grant-supported study this past year described use of a dietary regimen in which 50–75 percent of the long-chain (natural) fats are replaced with medium-chain triglycerides, which previously had been shown by other Institute grantees to be of substantial value in managing various other fat malabsorption disorders. Such a regimen in patients with the short-bowel syndrome now has led to a gradual decrease in diarrhea and decline in fecal loss of water and electrolytes and to significant improvement in the patients' nutritional status on long-term follow-up.

LIVER DISEASE

The liver performs a multitude of complex biochemical tasks without which life cannot exist. The largest single organ in the human body, the liver functions, for example, as a "chemical filter" and clearing station for purification and detoxification of blood, as a storage house for certain nutrients (particularly carbohydrates, certain minerals, and vitamins), as a site of production of blood proteins, as a secretory gland which aids both digestion and the removal of wastes as well as myriads of other metabolic functions. Not surprising, an organ of such complexity is subject to a wide variety of injuries and disease states.

Hepatitis

The two major liver diseases, cirrhosis (on the increase in our adult population) and hepatitis (increasing at an alarming rate among our young population) are both crippling and potentially fatal diseases of great social and economic importance. A most rapidly moving field has been the finding of an association between the presence of a viral-like substance ("Australia antigen") and a type of hepatitis transmitted primarily through blood transfusions or by contaminated needles. There is some evidence that fatal liver necrosis or cirrhosis occurs only in those cases of acute viral hepatitis in which the antigen is present. If further work establishes this, much apprehension, and costly medical care could be eliminated in the less hazardous cases. Further work may eventually permit the development of a vaccine effective against hepatitis or a therapeutically effective antibody preparation against Australia antigen.

Prednisone in Liver Disease

In a study of various drug regimens in the treatment of chronic active liver disease, Institute grantees at the Mayo Clinic have found prednisone to be clearly superior, either alone or in combination with azathiorpine to azathioprine treatment or nonspecific supportive treatment without use of either drug. The investigators examined 60 patients for up to a period of three years, and observed remissions in slightly more than half of the patients on either prednisone or the combination. Only in this group were there patients whose liver function and histology became normal enough for them to discontinue therapy.

Soft Drink Remedies Cirrhotic Intoxication

Patients with advanced cirrhosis of the liver frequently exhibit neurological symptoms similar to the signs of acute intoxication. Because of their inability to detoxify ammonia and related nitrogen compounds (the former through conversion, in the liver, to urea), they exhibit slurred speech, confusion, staggering gait, and have a tendence to lapse into coma. The usual treatment is a low-protein diet and neomycin to eliminate the intestinal bacterial flora which produces ammonia from nitrogen sources in the bowel.

Now, a grant-supported investigator at Harvard University has produced a more acceptable, and possibly more effective remedy by developing a fig-flavored soft drink containing the rare sugar lactulose, which to date has been given to 20 patients prone to hepatic coma because of chronic liver impairment. Eleven responded well, six stopped therapy for various reasons, and three died. The scientist noted that these patients are often near the end of their lives from far-advanced cirrhosis and improvement is measured in weeks or months rather than years. The longest survivor has now been on lactulose treatment for 21 months.

In contrast to the usual dietary sugars, lactulose is not absorbed from the gastrointestinal tract into the bloodstream. Thus this unusual carbohydrate remains in the bowel and is available there for fermentation by intestinal bacteria. If lactulose is administered on a regular basis the bacterial population in the intestine changes in character from a primarily put refractive one, which is largely responsible for the production of potentially toxic ammonia from various nitrogen sources, to a fermentative one, thus preventing much of the production of ammonia which is responsible for the symptoms of hepatic coma.

The presence and fermentation of lactulose in the intestine also cause a drop of pH in the bowel (renders contents more acid), which deters the absorption of ammonia.

The usual dose of the experimental lactulose-containing beverage is six to eight ounces, taken three times a day after meals. The greatest benefit from the treatment is that it keep patients from lapsing into a coma that necessitates hospitalization and is potentially life-threatening.

OUTLOOK

Although this resume of research progress in digestive diseases encompasses but a small portion of the Institute-financed research in this extremely broad field, it demonstrates the diversity and productivity of the many investigations conducted and supported by the National Institute of Arthritis and Metabolic Diseases. These and other research findings are systematically uncovering numerous promising and new scientific leads and approaches in the search for improved methods of treatment and diagnostic techniques for the millions of individuals disabled by and afflicted with digestive disorders. While some of these advances have found immediate application at the bedside, others, of a more fundamental nature, are contributing to the broader base of research knowledge from which comes future progress in these disorders. Altogether, these findings give renewed hope for improved therapeutic modalities in the field of digestive diseases in the foreseeable future.

Recommendations of Nondepartmental Witnesses: Budget Increase

Senator Cotton. Some outside witnesses have been recommending that we add $5 or $6 million for digestive diseases. Could this money be effectively used?

Dr. Rall. We think it could; yes, sir, in terms of training, in terms of research grants, and in terms of direct operations.

Dr. Marston. Mr. Chairman, this is one of the areas that you referred to earlier in which groups have been concerned about the special emphasis on cancer. We have been hearing and I suspect the committee has been hearing strong pleas for support, particularly from those interested in gastroenterology. Similarly, those people interested in pulmonary problems feel that if they somehow had additional visibility that they woud be able to get the financial support that they feel is needed.

We will always have the problem of making choices between a number of desirable goals. It is particularly true in this instance because of the concern in recent years by those in the field of gastroenterology. Naturally they have felt that, with more research, one could do more about these diseases that affect so many people in this country.

KIDNEY DIALYSIS

Senator COTTON. Now this next one the chairman should be handling. It is the eternal problem. I think that most Members of Congress get more real desperate bitter letters on it than any other subject. That is this matter of kidney dialysis, the cost, and what can we do to get it to more citizens, because we still apparently are—not quite as much as in the old days, but we still are in a position where A can live and B must die because of inability to get this dialysis.

What do you have to say about that today?

Dr. MARSTON. Before Dr. Rall comments on that, Senator Cotton, I am sure you are aware that a program for chronic dialysis units has been set up under HSMHA. It sounds to me as though the people you mention have in mind those units which actually provide services for dialysis.

If this program did not come up before, Mr. Miller might want to get additional information on it. This Arthritis Institute, of course, is deeply involved in two aspects of the kidney problem, both in the development through research on more effective and economical artificial kidneys, both in terms of human resources and dollars, and, equally, or perhaps more importantly, to try to prevent the kidney disease problem that requires dialysis.

Dr. RALL. I think Dr. Marston has summarized it. It certainly is more effective to prevent kidney disease than to substitute a machine for natural kidneys. The cost now in the hospital is of the order of $25,000 to $35,000 a year for chronic renal dialysis two or three times a week.

The home dialysis methods have been improved rather considerably with a hollow fiber kidney and with the envelop kidney which were developed under our contract program. This reduces the cost to between $5,000 and $8,000 a year, if you have a home setup with helpful and competent home assistance.

We also have had considerable research work in progress on transplanting kidneys particularly with respect to the matching of donor or cadaver kidneys with patients who need the kidneys. There is some reason to hope with better tissue matching we can get a better success rate of survival of the transplanted kidneys.

The success rate with cadaver kidney is 40 percent with 2-year functional survival of the transplanted kidney. With related donors, a 75 percent, 2-year survival of the kidney may be achieved.

Some patients have been transplanted twice or three times and go back on dialysis if the transplant fails.

MOBILE DIALYSIS UNITS

Senator COTTON. In some States don't they have some kind of vehicle just like the vehicle that goes around and X-rays people's lungs and collects blood and so forth? Some kind of vehicle that covers neighborhoods with this machine?

Dr. RALL. I am not aware of such a service specifically, but what is available in several areas is a statewide network of tissue typing and matching of patients who are on dialysis and need a transplant so that when a donor or cadaver kidney becomes available the best matching patient can be selected to receive it.

Ancillary to this is a device to preserve a kidney developed by one of our grantees. If you can preserve a kidney, and they can be preserved up to 36 hours, if you can preserve it that long, you can tissue type it and then provide it to the man or woman whom it matches best. Quite clearly this is going to get the best transplant survival results in the long run.

Senator COTTON. Yes; but we are talking about something else. Didn't we have testimony last week, was it Indiana or some State that had set up a circulating dialysis service?

Senator MAGNUSON. It was in the regional medical programs.

Dr. RALL. I guess that must be a mobile dialysis unit.

Senator MAGNUSON. Yes.

Dr. RALL. I don't know how satisfactorily that would work. There can be complications because the usual time of dialysis is 8 hours, for example.

In some hospitals it is longer than that. It depends on the type of artificial kidney that is used. This is not a matter of quick chest X-rays. Where with the aid of a mobile unit you can spend 10 minutes with this patient or 10 minutes with that. Once they are dialyzing a patient, they are tied up for 8 hours or more. This has a tendency to militate against the effectiveness of the mobile unit. But I can conceive such a use for individual patients in areas devoid of hospital dialysis centers or possibilities of home dialysis.

COMMUNITY AND HOME DIALYSIS

Senator MAGNUSON. Say you had three cases in a given community or a half-dozen, but they had no machines or anything available. They do, don't they, take all six of them at the same time in a ward?

Dr. RALL. Yes, sir; there have been a variety of developments which are just beginning. There is a group of physicians in the Washington area, in the suburbs, that are setting up nonprofit or commercial dialysis units where you come in at night or in the afternoon. It is not a general hospital, it is a specialized unit.

Senator MAGNUSON. They can treat them all. Dr. Scribner, I think, has that going out in Seattle where I think they have a 12-bed place. But it is in adjunct to the Swedish Hospital. I think he has 12 beds. I am not sure, but I think he has.

This might show some promise where you could gather people, a couple of times a week in a certain place, from around an area that could not go to the hospital or someplace.

Do you have any research in bioengineering on this?

Dr. RALL. Yes, sir.

Senator MAGNUSON. This is important.

Dr. RALL. One of the major thrusts of our Artificial Kidney Contract Program is bioengineering of the cannulas. The Dr. Scribner you referred to is a grantee of our Institute who invented the system of implanted plastic tubes (cannulas) which permit the repeated connection of patients to an artificial kidney.

Senator MAGNUSON. We still have people who have to die because they can't get it.

Dr. RALL. Yes, sir.

Senator MAGNUSON. That is a sad commentary, isn't it?

Dr. RALL. Yes, sir.

KIDNEY TRANSPLANT

Senator MAGNUSON. We are talking more about the other. The doctor from Georgetown, Dr. Schreiner, was very optimistic about the transplant they are doing. But he did mention that where they failed, you have to fall back on the machine. This poses a problem, too, the unavailability of machines.

He said they can do that and they can keep them going where the transplant failed, I guess, or didn't work quite right.

Dr. RALL. Yes, sir; you can't separate the two because you can't have a transplant center without dialysis. Also, it does not make too much sense to have a dialysis center without possibilities to transplant suitable patients.

REDUCTION OF COST OF DIALYSIS

Senator MAGNUSON. One question to clear this up. I understood from some other testimony, I think you folks testified last year, that the cost of the machine was getting down. Is that correct?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Is that correct?

Dr. RALL. Yes, sir.

Senator MAGNUSON. It is getting within reach through bioengineering?

Dr. RALL. It depends upon what you mean by reach.

Senator MAGNUSON. Financial reach is the main thing.

Dr. RALL. I mean as to what level of cost you think is within reach.

Senator MAGNUSON. I am talking about the machine, itself. Now, the real cost is in the operation.

Dr. RALL. Yes, sir.

Senator MAGNUSON. I understand that. But if we got the machines down to a reasonable cost, some people would not have to die because of lack of one, then we would have to zero in on the kind of training needed to operate them, and operating cost.

Dr. RALL. Yes, sir.

Senator MAGNUSON. It seems to me one of your priorities out there in the bioengineering research, if you give grants on this, is to get that machine down where that cost is not going to be prohibitive.

Dr. RALL. Yes, sir; that is true. In addition to the machine, I must point out you need the dialysis fluid which has to be sterile and in large quantities.

Senator MAGNUSON. I understand that.

I am talking about getting the machine.

Dr. RALL. It is a complex of all these factors that have to be improved—original acquisition cost of the machine and cost of operation.

Senator COTTON. What does the machine cost now?

Dr. RALL. It depends on which one you are talking about. The hollow fiber dialyzers cost about $17 or $18 a piece and can be used four or five times. With those, you don't need a blood pump. With the coil-type dialyzers, you need a pump.

Senator MAGNUSON. With the oldtimer you had a big pump.

Dr. Rall. That is right; then you need apparatus to flush the dialyzing fluid through the dialyzer to purify the blood. These are the parameters you have to try to make more efficient and cheaper.

Senator Magnuson. It seems to me that that is some research we ought to be thinking about. It is pretty hard in a country like this to justify the fact that somebody is going to die because he doesn't have the money to live. That is what it amounts to.

Nonavailability of Dialysis Machines

Senator Cotton. And it is pretty rough for us. The American people have been schooled in the belief that money will do anything and they want to know why we aren't appropriating enough so that every person who needs dialysis could obtain it. And yet year after year after year, and I have been on here 12 years, we always get the same letters. Where I come from I guess Massachusetts General in Boston is the nearest place for anybody in Vermont and New Hampshire. Maybe they can do it at Hitchcock in Hanover.

Then, of course, the cost is way, way beyond the reach of people of small means. Even if they are of moderate means, it would eat up the savings of a lifetime in 6 months. So that we have this recurring problem.

Someday, somehow, we have to be able to meet it.

Dr. Rall. We think that the long term answer is prevention.

Senator Magnuson. We understand that, but we are talking about both. We don't stop at prevention. That is the long term answer. But we have these other things right here. We ought to be doing both—the emphasis should be on both of them.

Sure we understand about the prevention.

Dr. Marston. We are in complete agreement with your position on this matter. I think it is worth recalling what has happened in the 5 or 6 years I have been coming to these hearings. Five years ago we weren't really talking about home treatment as being an effective and possible method for the people. An improvement in the machines has occurred since that time. So, we now have a combination of progress and the need to study the remaining major problems; undoubtedly, a machine that can be handled by less well-trained people under less exacting conditions could make a lot of difference.

Our programs are clearly directed to move as rapidly as we can in this area.

Senator Magnuson. Dr. Scribner, when I was home over the Fourth, had a feature story in the paper. He treated a fellow who had been 12 years on the machine and was working every day, he looked good, 12 years, he saw no reason why he should not go 12 more, or the patient did at least. That shows what you can do if you get at it. I don't know what type he had. He was up at that clinic place of his.

Senator Cotton. Would you say that you were making progress in the diseases of diabetes, arthritis, and cystic fibrosis?

Dr. Rall. We hope so. I mentioned a few of the things that we have tried to do and the things that have happened in rheumatic arthritis in the last year from a therapeutic standpoint.

DIABETES RESEARCH

In diabetes, we are learning a great deal more about how complicated it is to manage the blood sugar and how complicated the regulation of insulin secretion is by means of amino acids as well as sugar and other hormones.

Therapy is currently at somewhat of an impasse: some oral drugs have worrisome problems associated with their use. There is, of course, insulin.

Senator MAGNUSON. On diabetes, though some of the oral drugs might have some side effects, you always come up with new ones someplace, somehow, even if there are some side effects, they are better off with the drug with side effects than nothing at all, aren't they?

Dr. MARSTON. This is one of the problems. We have had a 10-year study of oral antidiabetic drugs in anticipation that they might decrease the possibility of later complications from cardiovascular disease. Unfortunately, the result seems to be the opposite.

Senator MAGNUSON. You mean you found out they didn't do that?

Dr. MARSTON. It appears that the drugs not only don't do what he had hoped, but the people who were on the drugs didn't do as well as if they had been treated by diet alone. Since these drugs that we had such hope for have not panned out the way we wanted them to, we are faced with a major question—what the role of regulating the blood sugar really plays in terms of preventing late complications.

We must now go back and study a problem that we thought we had already settled. On the other hand, this is not to say that the oral antidiabetic drugs don't have any use in the specific case where the individual doctor decides to use them, but it does mean that the evidence shows that you are better off to try diet first than to try to use them.

Senator MAGNUSON. What about both?

Dr. MARSTON. In looking at this study, we have no evidence that the oral antidiabetic drugs contribute at all to the prevention of late complications from cardiovascular diseases, but, indeed quite the opposite. The risk is high. The study is not set up to answer every possible question, but the questions it does answer, I think, are very clear cut.

Senator MAGNUSON. Doctors still prescribe the oral.

Dr. MARSTON. Yes, sir. However, if they are prescribed with full knowledge of these studies, and have judged all aspects of the findings, that is the best treatment to follow. However, it was absolutely essential to have this type of information available, difficult as it was difficult to obtain, even though it didn't come out the way we had hoped it would.

FINANCING INSTITUTE PROGRAMS

Senator COTTON. In the budget you are only getting a million more than you had in 1971.

Dr. RALL. Yes, sir.

Senator COTTON. Does that mean you are cutting back some of your program?

Dr. RALL. It means that most of that million dollars is going into the grants for which we have a moral commitment, continuing grants. Almost everything else is going down or staying about the same.

Senator Cotton. With the increased cost, some of them have to go down.

Dr. Rall. Yes, sir.

Senator Cotton. Are you content with that?

Dr. Rall. With Dr. Marston on my left, I am hesitant to say too much.

I think we could perhaps profitably spend in some areas additional funds.

Senator Cotton. I won't put you on the spot that way.

Let me ask it differently. What particular program could you make, vital programs could you make effective progress on if you had a little more money?

Dr. Rall. We are concerned about the kidney program that you spoke of which has gone down from $4.7 to $4.2 million from fiscal 1971 in the President's budget in terms of solving just the problems you both have pointed out so clearly. We are concerned about trying to increase what we know about all the diseases of the gastrointestinal tract and the liver in the presence of a constricted budget. We are interested in diabetes because, as Dr. Marston has indicated, from a therapeutic standpoint we are back to a decade or so ago.

These are just three areas where we would like to make greater progress.

Senator Cotton. I got the impression that, and I commend you for it, you are looking to this kidney problem from the standpoint of prevention and kidney transplants, finding some way of being more successful. But you more or less have written off to some extent, I don't mean that literally, you have feeling that at some time it won't be necessary to have dialysis but it is necessary now and how much emphasis are you putting on trying to reduce the cost and increase the delivery of dialysis?

Improvement of Dialysis Techniques

Dr. Rall. I left the wrong impression, sir, because almost 90 percent of our program in the artificial kidney area is directed toward improving dialysis techniques as being the thing that is immediately necessary. It will be needed if transplants are easily available because people have to be dialysized before. The majority of our effort is going directly into bioengineering, designs, and improvement of kidneys.

Senator Cotton. But would a small investment if it were earmarked for that particular thing to help to make some progress? I know we can't make this available to everybody, but would it increase the percentage of people?

You would have to have cooperation from regional medical setups and so on, but would even a small additional amount make some progress in that because this is something that we are on the spot on all the time.

Dr. Rall. We think it would. Again, it is a question that it is hard to promise, but it is a fairly straightforward engineering problem, and we would hope that with the small progress which has been made we could accelerate it and, basically, produce a better product for less money, which is what is needed.

Senator Cotton. Have you any surveys or any estimates of the percentage of people in need of dialysis who now have it and the percentage that perish for lack of it?

Dr. Rall. We have an estimate that some 55,000 people a year now die of kidney disease, but of those probably only 7,500 would benefit from dialysis. This is a year. I think of the order of less than a thousand cases a year are put on dialysis which is of the order of 6,000 or so cases a year are dying that might be put on dialysis.

Senator Cotton. Thank you.

That is all.

Senator Boggs. Mr. Chairman, I have been very much interested in this.

On arthritis, under this budget with the cost of the things you are trying to do, the priorities you are giving, are you in any way cutting back on your arthritis efforts?

Dr. Rall. No. The arthritis budget is staying more or less constant, from around $12 million in fiscal 1971 to $11.9 million this coming year.

Senator Boggs. Doctor, what kind of progress—maybe you have said it and I didn't hear it—do you report on the arthritis effort?

Dr. Rall. I think they can be summarized along two lines. One in terms of the etiology where there is some report that you can take material from a patient with rheumatoid arthritis, inject it in mice and reproduce an arthritis and inject that in another mouse and reproduce the arthritis, which suggests some infectious etiology.

Another series of experiments with mycoplasma, shows that they can cause experimental arthritis in pigs and mice. In addition, one investigator has reported finding by electronmicroscopy of the joints of patients with rheumatoid arthritis, objects which look as though they might be a virus. It is impossible to say at present what the precise etiology of this disease is. This is certainly an area that is being pursued actively.

The other line of investigation in arthritis is thereapy where I mentioned cyclophosphamide and histadine—new drugs used in treatment.

Senator Boggs. Is private research moving forward pretty substantially, private effort?

Dr. Rall. As exemplified by the American Rheumatism Association?

PRIVATE RESEARCH

Sneator Boggs. Yes; and the Arthritis Foundation.

Dr. Rall. Yes. They are moving ahead but their funds are not large.

Senator Boggs. They depend on the institute, really, for the real progress?

Dr. Rall. The major part of the funding is by the Federal Government.

Senator Boggs. You feel that you are holding your own, at least, with this budget, you are not slipping back in the research?

Dr. Marston. As I have mentioned in my opening statement concerning the impact of the 1971 increases across the NIH, this is one of several institutes that did not benefit by the Congressional increases in 1971. Indeed it has had a downward drift from 1970 to 1971 so that the 1972 budget is below the 1970 appropriation which is not true of the NIH budget as a whole. In contrast to the National Heart and Lung Institute, which had a substantial 1971 increase, this institute had a decrease last year, and, in terms of program substance, less than a hold-the-line budget.

Senator BOGGS. What kind of goal do you have, if there is such a thing on arthritis research and progress on arthritis? Do you have a 5-year goal or 10-year goal, or can you measure it in those kinds of terms, Doctor?

Dr. RALL. In the first place, arthritis consists of multiple diseases including osteoarthritis where there is a special problem because it is so strongly age-related. Recently there has been renewed interest in this very common and important disease. With rheumatoid arthritis, our goal is to work simultaneously on the etiology of it, and on better measures for its treatment.

It is very hard to put a timetable on when we think we could honestly reach either of these goals.

Senator BOGGS. Thank you.

Thank you, Mr. Chairman.

Senator MAGNUSON. Thank you very much.

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

For expenses, not otherwise provided for, necessary to carry out title IV, Part E of the Public Health Service Act with respect to general medical sciences, including [the training of clinical anesthesiologists and] grants of therapeutic and chemical substances for demonstrations and research, [$166,072,000] *$150,400,000.*

National Institute of General Medical Sciences

Amounts Available for Obligation

	1971	1972
Appropriation	$166,072,000	$150,400,000
Real transfers to:		
(Proposed transfers for increased pay costs)		
"National Heart and Lung Institute"	-1,446,000	---
"Health Manpower"	-816,000	---
"Division of Dental Health"	-363,000	---
"National Cancer Institute"	-898,000	---
"National Institute of Dental Research"	-183,000	---
"National Institute of Allergy and Infectious Diseases"	-119,000	---
"National Institute of Child Health and Human Development"	-262,000	---
"Division of Research Resources"	-44,000	---
"National Library of Medicine"	-229,000	---
"Office of the Director"	-236,000	---
"St. Elizabeths Hospital"	-1,282,000	
Comparative transfers to:		
"Office of the Director"	-21,000	---
"National Heart and Lung Institute"	-429,000	---
"Health Manpower"	-5,361,000	---
Comparative transfer from:		
"National Heart and Lung Institute"	+144,000	---
Total obligations	154,527,000	150,400,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
54	Research	---	$87,892,000	---	$87,657,000	---	-$235,000
	General Research support grants		(6,978,000)		(6,218,000)		(-760,000)
	Scientific evaluation grants		(1,487,000)		(1,487,000)		---
	Pharmacology-Toxicology research		(3,593,000)		(3,593,000)		---
	Anesthesiology and Diagnostic Radiology centers		(950,000)		(950,000)		---
61	Fellowships		18,454,000		15,142,000		-3,312,000
65	Training		38,385,000		38,385,000		---
	Direct operations:						
70	Collaborative research and development	---	4,548,000	3	3,607,000	+3	-941,000
72	Training activities	15	354,000	15	373,000	---	+19,000
72	Review and approval of grants	120	3,577,000	123	3,846,000	+3	+269,000
73	Program direction	56	1,317,000	56	1,390,000	---	+73,000
	Total obligations	191	154,527,000	197	150,400,000	+6	-4,127,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions.....	191	197	+6
Full-time equivalent of all other positions............................	5	5	---
Average number of all employees........	192	200	+8
Personnel compensation:			
Permanent positions..................	$2,530,000	$2,781,000	+$251,000
Positions other than permanent........	44,000	54,000	+10,000
Other personnel compensation.........	24,000	24,000	---
Subtotal, personnel compensation....	2,598,000	2,859,000	+261,000
Personnel benefits..................	262,000	289,000	+27,000
Travel and transportation of persons..	161,000	172,000	+11,000
Transportation of things.............	22,000	22,000	---
Rent, communications, and utilities...	156,000	171,000	+15,000
Printing and reproduction............	157,000	161,000	+4,000
Other services:			
Project contracts..................	4,548,000	3,603,000	-945,000
Payment to NIH Management Fund......	1,675,000	1,772,000	+97,000
Other..............................	135,000	81,000	-54,000
Supplies and materials...............	60,000	62,000	+2,000
Equipment....	22,000	24,000	+2,000
Grants, subsidies, & contributions....	144,731,000	141,184,000	-3,547,000
Total obligations by object.......	154,527,000	150,400,000	-4,127,000

Summary of Changes

1971 estimated obligations	$154,527,000
1972 estimated obligations	150,400,000
Net change	-4,127,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	---	---	---	+$125,000
2. Within-grade pay increase	---	$2,517,000	---	+51,000
3. FTS rate increase	---	50,000	---	+15,000
4. Additional day of pay in 1972	---	---	---	+12,000
5. Non-competing continuation grants	---	---	---	+3,498,000
B. Program:				
1. Collaborative research and development	---	4,548,000	+3	+55,000
2. Review and approval	---	2,030,000	+3	+65,000
C. Payment to the "NIH Management Fund" for centrally furnished services	---	1,636,000	---	+97,000
Total, increases	---	---	+6	+3,918,000
Decreases:				
A. Program:				
1. Research grants	---	6,978,000	---	-3,733,000
2. Fellowships	---	18,454,000	---	-3,312,000
3. Collaborative research and development	---	4,548,000	---	-1,000,000
Total, decreases	---	---	---	-8,045,000
Total, net change	---	---	+6	-4,127,000

Explanation of Changes

Built-in Increases: These increases will provide: $125,000 for annualization of pay increase costs effective in fiscal year 1971; $51,000 for within-grade pay increase in 1972; $15,000 for increased rate in 1972 of using the Federal Telecommunications System; $12,000 for an additional day of pay in F.Y. 1972 and $3,498,000 for non-competing continuation of research grants.

Research Grants: The total program decrease of $3,733,000 reflects a decrease of $2,973,000 for competing projects and $760,000 for general research support grants, a program included in each NIH Appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships: The total program decrease of 460 awards and $3,312,000 reflects a reduction of 414 new awards amounting to $2,726,000, 33 awards in non-competing projects for $385,000, 13 awards in competing awards for $195,000 and $6,000 for supplementals. This represents a reduction of 216 predoctoral awards, 196 postdoctoral, 43 special, 3 development awards, and 2 career awards.

Collaborative Research and Development: The total program decrease of $941,000 includes three positions and $59,000 for costs required to administer the contracts program of the Institute. A decrease of $1,000,000 for contracts is reflected in the area of biomedical engineering and automated clinical laboratories.

Review and Approval: The program increase of three positions and $65,000 will provide additional staff required to effectively develop and administer the genetics program.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action taken or to be taken
1971 House Report	
Genetics	
1. The Committee feels that the time has come to recognize the importance of the synthesis of the gene and other equally dramatic developments in the science of inherited human qualities. It is mindful that genetic knowledge ultimately will solve a whole spectrum of diseases. Current knowledge in this field must be brought into focus and the leads at hand developed in an orderly way.	1. The focal point for this effort will be within NIGMS. Each of the categorical Institutes will collaborate through a task force to be established by the Director of NIH. Plans are now being made to fund additional projects in genetics and develop certain knowledge related to genetics.

Authorizing Legislation

Legislation	1972 Authorized	 Appropriation requested
Public Health Service Act Section 301--Grants programs...........	Indefinite	$150,400,000
Title IV, Part E, Institutes of Child Health and Human Development and of General Medical Sciences...............	Indefinite	150,400,000

PUBLIC HEALTH SERVICE ACT

The legislative authority in Section 301 of the Public Health Service Act which provides for the award of grants for research, research training, and fellowships is included in the section of the justifications under the tab, "Preamble Paragraph" in Volume IV.

"Sec. 442. The Surgeon General is authorized, with the approval of the Secretary, to establish in the Public Health Service an Institute for the conduct and support of research and research training in the general or basic medical sciences and related natural or behavioral sciences which have significance for two or more other institutes, or are outside the general area of responsibility or any other institute, established under or by this Act."

"Sec. 444. The Surgeon General shall, through an institute established under this part, carry out the purposes of sections 301 with respect to the conduct and support of research which is a function of such institute...."

"Sec. 433. (a) .... In addition, the Surgeon General is authorized to provide training and instruction and establish and maintain traineeships and fellowships, in such institute and elsewhere, in matters relating to the diagnosis, prevention, and treatment of such disease or diseases with such stipends and allowances (including travel and subsistence expenses) for trainees and fellows as he may deem necessary, and in addition, provide for such training, instruction, and traineeships and for such fellowships through grants to public and other nonprofit institutions. The provisions of this subsection shall also be applicable to any institute established by any other provision of this Act to the extent that such institute does not already have the authority conferred by this subsection."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfers to:		
National Heart and Lung Institute	-$1,446,000	Proposed transfers for increased pay costs.
Health Manpower	-816,000	
Division of Dental Health	-363,000	
National Cancer Institute	-898,000	
National Institute of Dental Research	-183,000	
National Institute of Allergy and Infectious Diseases	-119,000	
National Institute of Child Health and Human Development	-262,000	
Division of Research Resources	-44,000	
National Library of Medicine	-229,000	
Office of the Director	-236,000	
St. Elizabeths Hospital	-1,282,000	
Comparative transfers to:		
Office of the Director	-21,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
National Heart and Lung Institute	-429,000	Transfer of regular research grants for the pulmonary research program.
Health Manpower	-5,361,000	Transfer of institutional support funds to Health Manpower.
Comparative transfers from:		
National Heart and Lung Institute	+144,000	To provide an equitable distribution of the management fund in 1972.

Year	Budget Estimate To Congress	House Allowance	Senate Allowance	Appropriation
1966	$124,538,000	$124,538,000	$129,388,000	$127,188,000
1967	137,175,000	142,613,000	145,113,000	145,113,000
1968	160,284,000	160,284,000	164,284,000	160,284,000
1969	165,777,000	161,250,000	166,250,000	163,513,000
1970	154,288,000	154,288,000	175,000,000	164,654,274
1971	148,376,000	166,072,000	171,072,000	166,072,000
1972	150,400,000			

Note: Included in "General Research and Services, National Institutes of Health," appropriation prior to 1966.

Justification

National Institute of General Medical Sciences

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..............	191	$2,860,000	197	$3,148,000	6	+$288,000
Other expenses.............	-	151,667,000	-	147,252,000	-	-4,415,000
Total..................	191	154,527,000	197	150,400,000	6	-4,127,000

General Statement

The National Institute of General Medical Sciences supports a broad base of fundamental research that seeks elucidation of those life processes whose alteration or disturbance may lead to disease. In addition the Institute develops and supports research programs on certain major health problems and in certain clinical specialties, the responsibility for which lies beyond the purview of the categorical Institutes. Specific programmed research objectives are to develop new knowledge for safer and more effective use of drugs, to understand the genetic basis of disease, to improve health services through the application of engineering knowledge to medical care; and to develop more effective automated laboratory procedures to improve and speed the diagnosis of disease. The Institute also has principal responsibility for training young medical scientists in some 20 preclinical and clinical disciplines, thus reinforcing strongly the total National Institutes of Health research effort.

The National Institute of General Medical Sciences is requesting a total of $150,400,000 for F.Y. 1972, a decrease of $4,127,000 from F.Y. 1971.

Research Grants

	1971	1972	Increase or Decrease
Research projects............	$74,884,000	$75,409,000	+$525,000
Special projects.............	13,008,000	12,248,000	-760,000
Total research grants......	87,892,000	87,657,000	-235,000

Introduction

The NIGMS has a broad mission to support fundamental research in the sciences basic to medicine. The primary goal of these research programs is knowledge and scientific discovery that will lead to a deeper and more comprehensive understanding of life processes--knowledge and understanding that are essential to progress in all areas of medical research and contribute to the advance of the research programs of each of the categorical Institutes.

In addition to the support of fundamental research, NIGMS has two other significant tasks:

a. The selective support of research projects in such fields as anesthesiology, radiology, and general surgery--clinical specialties which do not relate directly to the mission of any of the categorical Institutes and hence have been relatively neglected in the past.

b. The development of research programs dealing with broad medical problems that are not appropriately handled by the existing categorical Institutes. Examples include research on trauma, the problems of pharmacology and toxicology as they arise from the use and misuse of drugs, and research relating to biomedical engineering and the automation of clinical laboratories--all of which have an important bearing on the delivery of health services.

Program Plans in 1971-1972

A special program is being developed on the genetics of disease, with emphasis both on the acquisition of basic knowledge and on clinical aspects of its application. Other areas of the fundamental sciences will continue to receive support on a competitive basis. Ongoing special programs (trauma, anesthesiology, diagnostic radiology, pharmacology/toxicology, automation of clinical laboratories, and biomedical engineering) will receive program emphasis in accordance with their needs and opportunities for development.

Fundamental Sciences

Support of the fundamental sciences can be justified both in terms of the immediate value of the knowledge gained in improving the diagnosis, treatment, and prevention of disease, and, more importantly, in terms of its long-term value to mankind. In a very real sense, support of the basic medical sciences can be regarded as a capital "one-time" investment made by this generation not only for its own benefit but for all future generations. The immediate gain is great; the long-range value is beyond measure.

The pay-off of fundamental research can best be demonstrated by noting some of the major advances in knowledge that have emerged from the biomedical sciences at an accelerating rate during this past century. The past century has seen:

-- The first proof that disease can be caused by bacteria and viruses.
-- The development of antiseptics, vaccines, and antibiotics.
-- The abolition of the great plagues that previously afflicted mankind.

- -- Major advances in our understanding of the nature of disease as it affects the various organs and tissues of the body.

The past half-century has seen:

- -- The discovery that many proteins of the body are enzymes, each of which catalyzes a specific chemical reaction within the body.
- -- The description of the thousands of different enzymes that carry on the complex metabolic activities of the living organism.
- -- The first clear demonstration that disease can result from an alteration in protein structure (sickle-cell anemia, 1949).
- -- Extensive studies on the structure of enzymes and other proteins, and how alterations in this structure can lead to disease.

The past score of years has witnessed:

- -- The affirmation of the one-gene, one-enzyme hypotheses: that the detailed information determining the structure of each enzyme, or protein, is encoded within the deoxyribonucleic acid (DNA of the nucleus) and that each enzyme, or protein, is represented by a single gene.
- -- The description of the structure of DNA as a double spiral or helix by Watson and Crick in 1953, and the first enzymatic synthesis of DNA by Kornberg and of ribonucleic acid (RNA) by Ochoa.
- -- Demonstration of the fact that viruses contain nucleic acids which modify and regulate the metabolic processes of cells they infect.

The past decade has seen:

- -- The cracking of the genetic code by Nirenberg in the early 1960's.
- -- Discovery of the processes by which information encoded within the DNA is first translated to ribonucleic acid and then transcribed into protein.

As we look to the 70's and 80's it can be predicted that the biomedical sciences will explore:

- -- The detailed structure of the 46 chromosomes within the nucleus of each cell to see how the information is encoded and stored within the DNA.
- -- The way in which the activity of each gene is turned on and off and controlled to produce the array of different proteins and enzymes that are needed within each cell.
- -- The means by which the identical genes in the differentiated cells of one type of tissue--such as muscle--are regulated and directed to synthesize one pattern of enzymes and proteins, whereas those in other tissues and organs--such as skin, liver, and nerve--produce markedly different patterns.
- -- How alteration of the information encoded within each gene leads to hereditary disease, and possible methods for its correction.

The fundamental knowledge being uncovered is bound to have a profound impact on our broad understanding of the biology of human cells and how they operate to utilize the information stored within the DNA. The knowledge gained will also increase our understanding of genetic disease and how its often catastrophic effects might be minimized or corrected. There are over 1,000 different diseases which are believed to be genetically transmitted or in which genetic mechanisms appear to have a highly significant role. These diseases range from sickle-cell anemia and cystic fibrosis to mongolism and many forms of mental retardation. Diabetes and high blood pressure are examples of diseases in which genetics appears to have a very important role. Although the incidence of any single genetic disease is not great, these diseases as a group tend to affect the very young; and the toll of mortality, illness, extensive hospitalization, and medical care exacted by them is very high. Since these diseases are transmitted to future offspring, the total burden of genetic disease on mankind is great indeed.

The underlying cause of these diseases lies either in the genetic code or in the way the code is read out and translated within the cell. Because of the importance of understanding the fundamental processes which lead to these diseases, it has been proposed in previous testimony before the Congress that a major program on the genetics of disease be developed which emphasizes the further development of fundamental genetic knowledge and the extrapolation of this knowledge into new approaches to the diagnosis, treatment, and prevention of genetic disease. The focal point for this effort will lie within the NIGMS, but Institutes with program interests in genetics will collaborate. An inter-Institute coordinating committee has been appointed to see that these funds are wisely allocated.

The Institute already has a significant base of support in the area of genetics, and the success of this research is leading to the increased feasibility of a major advance in the alleviation of this large group of diseases. Much of this early success can be attributed directly to basic genetic research on biological systems less complex than man, including viruses and bacteria. With the armamentarium of genetic principles thus derived, it is possible now to study the inherited diseases of man more directly.

During the coming year an increasing proportion of available resources will be directed toward human genetic disease. Several areas of emphasis have been selected because they are particularly relevant to the extension of basic genetic knowledge to research on the genetic aspects of disease in man. These include (1) banks of human cell lines wherein strains of human cells representing diverse types of genetic disease can be preserved and used as needed by investigators requiring these cell lines for their research; (2) better methods for the detection of the carrier state of certain genetic diseases; (3) the detailed mapping of the genes on human chromosomes; (4) extensive research on the regulation and control of the expression of the genetic information encoded in the human chromosome.

Although genetics and genetic biochemistry are at the focal point of scientific interest at this time, other fundamental research areas also demand urgent attention. Progress in these areas will have profound implications for cancer research, neurobiology, and for an understanding of the processes of development and aging within the human body. Some of the important problems are listed below:

- The development of new arrays of instruments and techniques that will help us to explore the detailed structure of proteins and nucleic acids.
- Development of high-resolution electron microscopes that will enable scientists to visualize the individual atoms of proteins, nucleic acids, and other biological macromolecules.
- Determination of the internal structure of enzymes to understand how complex chemical reactions, difficult to execute within the laboratory, are carried on with apparent ease within the enzyme molecule.
- Research on how the structure and biological activity of enzymes and other proteins can be modified by drugs, heavy metals, and other toxic agents, leading to marked changes in the metabolic behavior of the human body.
- The detailed study of the sequential steps which characterize the cell cycle and the process of cell division, in an attempt to discover the regulatory processes that lead cells into and out of the division process.
- Studies on the relationship of changes in cell structure to the selective expression of the information encoded within the cell's genetic apparatus.
- Research on the detailed structure of cell membranes and cytoplasmic organelles; how these structures are formed within the cell, and how they are modified during the cell's life span.
- Studies on the phenomenon of contact inhibition, by which normal dividing cells stop dividing on contact with other cells--a phenomenon missing in cancer cells.
- Studies of the biology of cell surfaces and cell junctions, and on the mechanisms by which cells recognize, identify, and communicate with other cells.

- -- Detailed studies of the biology of cell movement, and how their movements are regulated and controlled.
- -- Detailed studies on the differentiation of primitive cells into the highly specialized forms that make up the array of different tissues and organs of the body.

In accordance with its primary function to support fundamental research in sciences basic to medicine, it is the task of NIGMS to spearhead this drive for basic biological and medical knowledge that will improve understanding of biological processes that lead to disease. Although the immediate "pay-off" of this research is significant, its long-term implications to health are beyond measure. The immediate or short-range "pay-off" can be demonstrated by the fact that for a number of years biochemists have known that hemoglobin is a protein with four subunits consisting of two alpha and two beta globin chains. In thalassemia--a disease common among Mediterranean peoples and their offspring in this country--the beta chains of hemoglobin are made in insufficient amounts while the alpha chains are made in normal quantities. Because of the beta chain deficiency, the red cells are prematurely destroyed in the body, producing persistent and often severe anemia. During the past year, an Institute grantee found evidence of a substance in thalassemic red cells that inhibits beta globin synthesis. Efforts are now being made to isolate the inhibiting factor and determine its chemical nature. This may lead us to clues as to how to prevent the inhibitor from accumulating in thalassemic cells and thus hopefully to the eventual development of successful treatment for this disease. Similarly, during the past several years several NIGMS grantees have been carrying out extensive research on the "microtubules" of cells, which appear to have an important role in cell movement and in the process of cell division. Recently neuropathologists have become intensely interested, since the common senile changes of the aging brain and premature appearance of such abnormalities which constitute an important disease of the nervous system known as Alzheimer's presenile dementia, a disease resulting in premature atrophy of the brain leading progressively to a state of total helplessness and prolonged institutional care, appears to result from microtubular abnormalities. Understanding of the cause may lead ultimately to its correction.

Special Programs

Trauma

Trauma has become a disease of epidemic proportions. It is the leading killer in the 1-44 year age group. Trauma victims require 22 million hospital days each year, equivalent to 120 hospitals of 500 beds each. The cost of personal injuries in 1968 was $17 billion, and 5 million work days were lost.

The Institute now supports nine trauma research centers, sophisticated units designed for the study of man's reactions to injury and for the development of new approaches to patient care, and 30 individual trauma research projects. Many of the problems of trauma require exploration in depth at the biochemical and physiologic level, and involve both basic scientists and clinical investigators. Thus the need for sophisticated monitoring and diagnostic equipment has brought basic science oriented bioengineers into the study teams; while, at the other extreme, psychiatrists are studying behavioral responses to injury. Past investment in the area of burns is beginning to pay off. In severely burned patients, lives have been saved by total fluid replacement within 24 hours; the application of pigskin for human grafting has reduced infection, the leading cause of death from burns; and a new antibacterial agent shows great promise in controlling surface infection in burn patients.

A symposium on trauma sponsored by NIGMS in May 1970 clearly defined a number of critical areas for research, extending from improved resuscitation techniques to better rehabilitation procedures. The research challenges offered by the symposium have resulted in a greater interest in studies of injured patients and an influx of exciting new concepts in trauma care. This program will receive special emphasis in fiscal year 1972.

Anesthesiology

The NIGMS program in anesthesiology supports research on the use of anesthetic agents, basic physiologic and metabolic changes resulting from anesthesia, relief of pain, management of respiratory failure, resuscitation, and intensive care. The present program includes regular research projects, three multidisciplinary program projects, and four anesthesiology research centers where investigations range from the development of basic information to clinical trial and application of research findings.

The anesthesiologist's responsibilities and expertise involve him in many phases of patient care, including the management of respiratory complications, inhalation therapy, and the use of analgesia in patients with chronic and severe pain. Anesthesia research is being expanded to include studies of the mode of action of inhalation anesthetics and muscle relaxants, the nature and control of pain, obstetrical and neonatal resuscitation, post-operative respiratory complications, and research on the pulmonary and systemic effects of drowning. The Institute plans to continue to develop the program because of its direct impact on the delivery of health services.

Diagnostic Radiology

The purpose of the Diagnostic Radiology Program is to support research on the use of various forms of radiation for the development of new approaches to the diagnosis of disease. The NIGMS program includes one radiology center, one program-project, and 19 individual research projects in a broad research effort utilizing ionizing radiation, radioactive isotopes, infrared radiation, thermography, and ultrasonic techniques for the investigation of structure and function in disease. The development and evaluation of new diagnostic equipment is an important objective of the program. Diagnostic nuclear medicine is an increasingly important area and offers unique opportunities for improved organ visualization studies of the dynamic function of organs and of regional blood flow. The application of new diagnostic techniques to the special problems of trauma patients is expected to make significant contributions to the trauma research program.

Automated Clinical Laboratories

This program has the goal of bridging the gap between new laboratory discoveries and the development of reliable and accurate diagnostic tests which are readily accessible to the physician and can speed the process of diagnosis and treatment. The NIGMS program focuses on the development and testing of new analytical procedures, the development of standard reference materials, and the design of automated equipment and of the computer hardware essential to reliable and successful automation. Presently available mechanization has already lessened the cost per test to the patient, and it is anticipated that further automation will reflect a substantial further reduction.

A new approach to laboratory analysis has been developed and incorporated into an instrument known as GeMSAEC, under an interagency agreement with the Oak Ridge National Laboratory. Work during the past year has markedly improved the capacity and reliability of this instrument. The first commercial model has now been installed in a clinical laboratory exclusively for service work.

Rapid progress is being made in the automation of bacterial culturing and identification of pathogenic bacteria. Present procedures delay this important identification by at least 24 hours. By means of the automated procedure, this time lag may be reduced to four hours, thus enabling the physician to institute therapy before the bacteria have had a chance to produce septicemia or other serious side effects. This saving in time will also contribute to significant reductions in the cost of hospitalization for patients with serious or life-threatening infectious disease.

Pharmacology/Toxicology

The overall objective of the Pharmacology/Toxicology Program is to improve medical therapy through improved understanding of the action of drugs and how their action is influenced by other factors, such as genetic differences among patients, concomitant administration of other drugs, etc. These studies are providing a basis for the safer use of presently available drugs and are contributing to the design of more effective therapeutic agents.

The pharmacology/toxicology centers, which provide a wide spectrum of integrated scientific activities ranging from basic laboratory science through to clinical application, are becoming an increasingly important resource for the improvement of medical therapy. During 1972 particular attention will be given to the consolidation and continued development of the existing pharmacology/toxicology centers and to the further development of clinical pharmacology. Newly developing areas which will be emphasized are pharmaco-genetics and chemical mutagenesis.

A badly neglected and important problem has been the lack of adequate knowledge related to the action of drugs in children and infants. During the past two years, efforts to stimulate studies in pediatric pharmacology have been encouraging and will continue to receive emphasis during 1972.

Biomedical Engineering

The program in biomedical engineering combines the mathematical skills and the analytical ability of the engineer with the knowledge and understanding of biological systems by the life scientist, in order to focus upon the solution of engineering problems associated with research on living systems and with the delivery of health care. Engineering methodology is also applied to the processing of medical information.

Significant progress is being made on many research projects. Of particular interest has been the development of telemetry systems for application to medical problems. For instance, a miniature radio telemetry system for monitoring fetal electrocardiograms in obstetrical patients during labor has been developed. This highly reliable, easily operated system permits the attending medical staff to detect important danger signals which indicate the onset of fetal distress. The system has worked equally well in a special perinatal clinical research center and in a typical community hospital. In another NIGMS-supported project a portable telemetry pack to monitor signals from the brain, eye, heart, and muscles has been developed. Although this telemetry pack should have many uses, it is particularly valuable for the study of epilepsy. Patients with this disease are frequently kept in a hospital for a considerable period during which no seizures occur, but the attacks recur when they return home. This telemetry pack will enable physicians to study the brain waves and other physiological characteristics of the patient in his home environment in an attempt to find the precipitating factors leading to the seizures.

During the coming year emphasis will be placed on the application of engineering theory and practice to research on the clinical evaluation and management of critically ill patients through (1) the development of new systems for rapid data acquisition and display that involve new types of transducers and integrated electronic circuitry, and (2) the development and application of mathematical models of physiological control systems to predict more accurately and rapidly the clinical status of the acutely ill patient.

Research Grants Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
Clinical Sciences.......	$8,911,000	$8,911,000	---
Pharmacology-Toxicology research.............	6,496,000	6,496,000	---
Bioengineering..........	9,757,000	9,757,000	---
Behavioral Sciences.....	867,000	867,000	---
Fundamemtal Sciences....	48,853,000	49,378,000	+$525,000
Subtotal regular program............	74,884,000	75,409,000	+525,000
General research support grants........	6,978,000	6,218,000	-760,000
Scientific evaluation and planning..........	1,487,000	1,487,000	---
Pharmacology-Toxicology research centers......	3,593,000	3,593,000	---
Anesthesiology and diagnostic radiology centers............	950,000	950,000	---
Total research grants...	87,892,000	87,657,000	-235,000

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting continuations..	786	$53,871,000	705	$57,369,000	-81	+$3,498,000
2. Competing projects	284	21,013,000	243	18,040,000	-41	-2,973,000
3. Subtotal regular program........	1,070	74,884,000	948	75,409,000	-122	+525,000
4. General research support grants.		6,978,000		6,218,000		-760,000
5. Scientific evaluation and planning		1,487,000		1,487,000		---
6. Pharmacology-Toxicology research centers......		3,593,000		3,593,000		---
7. Anesthesiology and diagnostic radiology centers		950,000		950,000		---
8. Subtotal special grants.........		13,008,000		12,248,000		-760,000
9. Total research grants.........	1,070	87,892,000	948	87,657,000	-122	-235,000

Fellowships

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Total Fellowships......	---	$18,454,000	---	$15,142,000	---	-$3,312,000

Introduction:

Through its various fellowship programs, the National Institute of General Medical Sciences fosters the training of highly qualified scholars for research and academic careers in the sciences related to health. To accomplish this objective support is provided for predoctoral, postdoctoral and special fellowships and also for research career program awards. Consistent with the interests and responsibilities of the Institute, fields of training include not only the broad spectrum of fundamental biomedical sciences, but also certain target areas such as biomedical engineering, pharmacology/toxicology, and selected clinical sciences exemplified by anesthesiology, diagnostic radiology and surgery. During fiscal year 1971, some 1,600 individuals will receive support under these several programs in leading institutions throughout the Nation. Many former fellows and awardees are now acknowledged leaders in their respective fields of science, and it can be predicted with confidence that from the pool of talented scholars for whom support is currently being provided will emerge many outstanding biomedical investigators and teachers of the future. Funds requested for 1972 will provide for an estimated total of 1,140 awards in the various programs, about 90% of which will represent continuations and the remainder, new awards.

Program Plans in 1971 and 1972:

Predoctoral Fellowships: Over the past decade, the Institute's program of predoctoral fellowships has provided support for some 5,600 young scholars for graduate training in a wide range of biomedical disciplines of concern to the entire NIH. Indicative of the scholastic success of these fellows in their graduate careers is the fact that, even by the most conservative estimate, no fewer than 4,500 (80 percent) have successfully attained the Ph. D. degree, which is the basic requirement for the pursuit of a career of research and teaching in nearly all institutions of higher learning. Relieved of the necessity of diverting time and energy to income-producing endeavors, these fellows have been able, according to a recent report of the National Research Council, 1/ to complete their doctoral-degree requirements in one to two years less time than would have been possible in the absence of financial support for full-time training.

Recognizing that training grants constitute a more effective and efficient mechanism for the support of predoctoral training than does a system utilizing central review of individually awarded fellowships, the decision was made to phase out the NIH predoctoral fellowships program. Thus, the awarding of new predoctoral fellowships was discontinued early in fiscal year 1971. The NIGMS will honor its commitments to all present predoctoral fellows, and for this purpose an amount of $2,450,000 is requested for the support of an estimated 440 continuation awards in 1972.

Postdoctoral Fellowships: These fellowships serve to enable talented young Ph. D.'s and M. D.'s to receive the additional year or two of advanced training, required with increased frequency because of the growing complexity of the biomedical sciences, to qualify them for responsible positions of research and teaching. That this program is serving as an important source of biomedical research and teaching manpower for our country's academic institutions is evidenced by a recent study of

1/ Effects of NIGMS Training Programs on Graduate Education in The Biomedical Sciences, March 1969 the positions currently occupied by 108 former NIGMS postdoctoral fellows who completed their training during the three-year period ending June 30, 1970. The results of this study indicate that a strikingly large proportion (85 percent) of these former fellows hold positions in academic institutions. Of the 92 so employed, 35 are in schools of medicine, six are in other health professional schools, and 51 are distributed among graduate schools and colleges of arts and science, agriculture, and engineering. Fifteen others are pursuing their careers in government or private research institutes and industrial laboratories, and only one was reported to be unemployed at the time of the survey.

Approximately 400 postdoctoral fellows will be supported by NIGMS in fiscal year 1971, with the $3,368,000 available. A total of $1,716,000 is requested for fiscal year 1972 in order to permit the continuation of this program at an estimated level of 207 awards.

Special Fellowships: The special fellowship program, which is characterized by a high degree of flexibility with regard to eligibility requirements, stipend levels, and duration of award, has proved to be a particularly effective mechanism for implementing the Institute's programmatic objectives. As originally designed, and as administered during the early 1960's, these awards were utilized primarily to support mature scientists in mid-career for appropriate periods of advanced or specialized training in the fundamental sciences for the purpose of updating or otherwise enhancing their research capabilities. In recent years, as the Institute's program goals have become less generalized and more clearly focused on meeting manpower needs in certain targeted areas, the special fellowship program has served as an important vehicle for accomplishing these objectives. It is being utilized to an increasing degree, for example, to support young physicians for research training in selected clinical sciences such as anesthesiology, diagnostic radiology and surgery for careers in academic medicine. In addition, particular emphasis during the last few years has been directed toward the support of qualified young engineers and biologists for training in the interdisciplinary field of biomedical engineering. The success of this latter endeavor is indicated by the fact that in fiscal year 1970, 57 special fellows were receiving training in biomedical engineering, compared to 11 in 1965.

During the current year, and in 1972, continued emphasis in this program will be devoted to the fostering of research training in the targeted areas indicated above. In addition, considerable effort will be directed to the development of more substantial representation in the fields of basic and clinical pharmacology, clinical chemistry, human genetics, and trauma, all of which are in need of well-trained investigators and teachers.

The important contribution of this program to the staffing of our Nation's academic institutions is indicated by the results of a recent survey of the positions currently held by 70 former special fellows whose awards terminated during the period from July 1, 1967, through June 30, 1970. The data reveal that 64 of these individuals (91 percent) are now employed in academic positions. Approximately two-thirds of these (43) are in schools of medicine and the remainder hold posts in other types of schools and colleges.

Thus, the special fellowship program, although relatively small in terms of awardees, is playing an important role in advancing the training missions of NIGMS. The $2,876,000 available for this program during the current year will provide support for approximately 190 individuals, and the $2,176,000 requested for 1972 will permit its maintenance at an estimated level of 148 awards during the forthcoming year.

Research Career Development Awards: This program, which is designed to foster the development of young scientists of outstanding potential for careers of independent research in the sciences related to health, has contributed, and continues to contribute, to an important degree to the provision of faculty members for our Nation's medical schools and other academic institutions. Illustrative of this contribution are the results of a recent study of the positions currently held by the Institute's former development awardees. The data reveal that, of a total of 373 former awardees, 335 (90 percent) now hold positions in academic institutions. Of these 268 are in schools of medicine, 12 are in schools of dentistry, public health, pharmacy and veterinary medicine, and 55 are in other types of schools or colleges. In terms of rank, 311 (93 percent) of those in academic positions are at the level of associate professor or above. When it is further realized that virtually all of the Institute's current awardees are also contributing to some degree to the teaching and research training of future physicians and biomedical investigators, the significance of this program to academic medicine is eminently clear.

In this program, as in the special fellowship program, continued emphasis is being placed on the encouragement of research and academic careers in such areas of biomedical engineering, basic and clinical pharmacology, anesthesiology, diagnostic radiology and surgery. In addition, an effort will be made through appropriate programming activities to increase representation in the fields of human genetics and trauma research, which have recently been identified as warranting special attention by this Institute.

The $7,714,000 available to this program in fiscal year 1971 will suffice to support 315 development awards compared to 323 for the previous year. These are long-term awards, the costs of which escalate annually as institutional salaries increase. In order to meet ongoing commitments and to maintain this important program at an estimated level of 312 awards during the forthcoming year, a total of $7,800,000 is requested for 1972.

Research Career Awards: Although new career awards have not been granted since 1964, provision must be made for the support of 33 ongoing awards which constitute commitments for fiscal year 1972. For this purpose, an amount of $1,000,000 will be required.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting..	1,012	$12,329,000	979	$11,944,000	-33	-$385,000
b. Competing.....	47	739,000	34	544,000	-13	-195,000
2. Supplementals.......	(200)	96,000	(125)	90,000	-(75)	-6,000
3. New Awards..........	541	5,290,000	127	2,564,000	-414	-2,726,000
4. Total fellowships...	1,600	18,454,000	1,140	15,142,000	-460	-3,312,000

Fellowships (By type of award)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Predoctoral.......	656	$3,450,000	440	$2,450,000	-216	-$1,000,000
2. Postdoctoral......	403	3,368,000	207	1,716,000	-196	-1,652,000
3. Special...........	191	2,876,000	148	2,176,000	-43	-700,000
4. Development Awards..........	315	7,714,000	312	7,800,000	-3	+86,000
5. Career Awards.....	35	1,046,000	33	1,000,000	-2	-46,000
6. Total Fellowships.....	1,600	18,454,000	1,140	15,142,000	-460	-3,312,000

Fellowships Program Analysis

Program Area	1971 Estimate	1972 Estimate	Increase or Decrease
1. Clinical Sciences	$1,025,000	-$910,000	$-115,000
2. Pharmacology-Toxicology......	1,200,000	1,060,000	-140,000
3. Bioengineering Sciences........	1,660,000	1,450,000	-210,000
4. Behavioral Sciences........	185,000	160,000	-25,000
5. Fundamental Sciences........	14,384,000	11,562,000	-2,822,000
6. Total Fellowships.	18,454,000	15,142,000	-3,312,000

Training Grants

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Total training grants...	---	$38,385,000	---	$38,385,000	---	---

Introduction

The major purpose of the graduate training grant program of the National Institute of General Medical Sciences is to provide highly skilled medical scientists and faculty for the health professional schools of the United States. Although much of the Nation's biomedical research is conducted within medical schools by their faculties and staff, nearly one-half of the PHS research grants support is awarded to university schools other than medicine, as well as hospitals, research institutes, and industrial laboratories. Consequently, projected needs for trained scientific manpower include these groups.

The development of a broadly based program of medical research and the improvement of the Nation's health care system depend more upon the existence of well-trained manpower than upon any other single factor. Through the collaboration of scientists and physicians the newer knowledge that is emerging from each of the scientific disciplines can make significant contributions to the improvement of the Nation's health care system. Within the biomedical sciences, today's research training is tomorrow's research; today's research is tomorrow's health care. As the citizen of 1970 would be totally dissatisfied with the quality of pre-antibiotic medical care available in 1940, so will the citizen of the year 2000 be dissatisfied with the 1970 level of medical care. Consequently, the NIGMS-trained scientists are an important resource for the research efforts of each of the categorical Institutes of the NIH.

Scientific disciplines encompassed within NIGMS training programs include biochemistry and molecular biology, biomedical engineering and systems physiology, biophysics, medical genetics, pharmacology and toxicology, clinical chemistry, automated clinical laboratory medicine, and trauma. The Institute also is almost the sole source of support for research and academic training in clinical areas such as anesthesiology, diagnostic radiology, and general surgery--disciplines which lie outside the primary missions of the categorical Institutes.

As new areas of science develop and become potentially important to clinical medicine, there must be an adequate supply of scientific manpower to translate research discoveries into meaningful applications. The training of these persons must begin many years in advance of the anticipated need, since a minimum of seven years of graduate training beyond the baccalaureate degree is necessary to produce a fully competent biomedical scientist.

Program Plans in 1971 and 1972

The Institute's policy in recent years has emphasized support of graduate training programs of high scientific merit and demonstrable productivity. To maintain these qualities as well as to be responsive to the dynamic, evolutionary characteristics essential to any scientific endeavor, a significant number of previously funded training grants of lesser merit have been discontinued. These have been replaced, in part, with new programs. Thus the Institute's training programs are continually being reoriented to reflect newly emerging manpower demands, and the development of newer scientific approaches.

The Institute's training programs are organized into four major areas of emphasis: (1) Basic Health Sciences; (2) Pharmacology-Toxicology; (3) Bioengineering Sciences; (4) Clinical Sciences. Funds requested for 1972 to support these areas will permit approximately 487 awards, compared with 514 in 1971, a decrease of 27.

Basic Health Sciences

Training in six basic science disciplines (anatomical sciences, biochemistry, biophysical sciences, genetics, microbiology, physiology), plus the behavioral sciences and a special multidisciplinary program in biological sciences, constitutes the major category of training programs supported by the NIGMS. Scientists trained in these areas contribute to the development of basic knowledge upon which applications and advances in all clinical sciences are dependent.

The solution of many of the current medical problems often requires simultaneous application of highly specialized knowledge and expertise to several fundamental fields. Recognition of this trend is reflected in the Institute's training programs, which bring together the knowledge and approaches of several disciplines. Interactions are particularly notable among biochemistry, microbiology, and genetics; biophysics, physiology, and engineering; and anatomy and pathology. For example, the development of an effective, modern research and training program in basic and human genetics depends upon advances in research and training in biochemistry. Thus, graduate programs in basic science disciplines are mutually supportive and interdependent, as well as vitally important for research and training in the clinical specialties.

Although the Institute's basic science programs predominantly support predoctoral training in the fundamentals of the basic medical sciences, they also serve to attract and train postdoctoral students from the physical sciences who wish to utilize their unique knowledge and capabilities for medical research. In addition, the Institute's programs support extensive postdoctoral training for physicians who wish to enter careers in medical research.

The Institute plans to continue to strengthen all relevant basic science disciplines and to stimulate their increased involvement with medical problems--both clinical and social in scope. Thorough research training for future faculty of biomedically oriented departments continues to be one of the primary goals of the NIGMS. As new medical schools are established and the size of the classes in ongoing medical schools increases, demands for the graduates of these training programs continue to be great. Scientists trained in each of the basic science disciplines are being increasingly sought to fill positions in clinical departments of medicine, pediatrics, surgery, etc.

Pharmacology-Toxicology Training Program

The last quarter century has witnessed a medical revolution because of many important drugs which have eased the suffering and saved the lives of millions of patients. However, the best drugs are useless if not prescribed, dangerous if misused; and much research must be completed to provide precise and specific information regarding their use. The primary objective of the pharmacology and toxicology program is to eliminate the great shortage of investigators and teachers in this area.

The Institute's training program has had a marked impact on the number of graduate degrees awarded in pharmacology and toxicology. Since 1958 the number of pharmacology degrees awarded annually in the United States has doubled, and more than 50 percent of these individuals received support from NIGMS. More than half of these persons are currently employed in academic research careers in medical schools. This high proportion of trainees engaged in academic careers has helped to alleviate the shortage of faculty members needed in medical schools to maintain superior standards of medical education.

Many emerging areas of research remain neglected, and trained persons in pharmacogenetics, chemical or drug-induced mutagenesis, carcinogenesis or teratogenesis, immunopharmacology, toxicology, and perinatal and developmental pharmacology are critically needed. To solve many of the health problems associated with drug interactions and toxicity, and to achieve rational therapeutic procedures, emphasis must be placed upon these areas of research training. With increasing interest and need to evaluate and prevent environmental pollution and drug-induced or chemical intoxication, the needs for such individuals will increase dramatically. Despite major efforts on the part of the Institute and its grantees, the areas of clinical pharmacology and toxicology continue to experience severe manpower shortages, and it is expected that these shortages will continue for at least five more years.

Biomedical Engineering Sciences

These programs encourage and enhance the development of the basic engineering sciences which are of obvious importance in solving health care problems. An urgent need exists to bring the knowledge and techniques of bioengineering and biomathematics into medical research. The clinical setting provides a particularly challenging opportunity for fruitful collaboration between physicians and engineers to develop important research programs and innovative new approaches to assure significantly improved patient care.

The program in biomedical engineering combines the engineer's mathematical skills and analytical ability with the life scientist's knowledge and understanding of biological systems. Particular emphasis is placed on the development of new instruments, devices, and systems needed for biomedical research and improved delivery of health services (patient monitoring, intensive care units, and modular segments of hospital information systems). Specialized manpower is urgently needed in specific areas such as the application of engineering concepts to the study of the control of biological systems; bioinstrumentation; biomaterials; use of computers in patient monitoring; prosthetic systems; and the automation of clinical laboratories.

Clinical Sciences

The Institute has research training programs in surgery, diagnostic radiology and nuclear medicine, anesthesiology, pathology, epidemiology, and the special Medical Scientist Training Program. In each program, the trainees gain the competence to conduct basic or applied research closely related to the clinical disciplines. The Medical Scientist Training Program, designed to integrate medical education with graduate-level training in medically relevant scientific fields, is available to a limited number of highly selected individuals. The graduates of these programs are expected to become major contributors to our understanding of human disease and its treatment, and thereby lay the foundation for better medical care. In addition, these special awards have motivated schools to improve and increase the flexibility of their medical curricula.

In response to specific congressional appropriations in 1966 to provide support in those areas where new knowledge and technology are urgently needed, NIGMS expanded and broadened its research and faculty training programs in anesthesiology, surgery, and diagnostic radiology. Anesthesiology and radiology present special problems because of the critical shortage of specialists in these areas. Few radiologists and anesthesiologists remain in medical schools to train additional clinicians urgently needed in these specialties.

Among the research training programs in pathology, there is an increasing emphasis on clinical laboratory science. Because there are only a handful of high-quality training centers in the clinical laboratory sciences, especially those competent in automated systems, progress in this important program has been relatively slow.

Because of mounting concern over the Nation's capability for treating trauma victims, selected surgery programs are directing their research training toward the pathophysiology of injury and the improved treatment of trauma victims. It is anticipated that committed and planned increases in the medical scientist programs will be achieved through gradual decreases in the current levels of training support in some clinical research training areas, as well as in selected fundamental science programs.

In 1967, the NIGMS initiated a program of five-year training grants for the support of clinical residency programs to increase the number of practicing physicians in anesthesiology. In the interim five years, changed circumstances, such as the initiation of the Medicare and Medicaid programs, the rapid rise in residency salaries paid by hospitals, coupled with the inadequate stipend levels provided by training grants, and the necessity for the NIGMS to concentrate its resources on research and faculty training led to the decision to phase out the support of clinical training grants in anesthesiology at the termination of their present commitments.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting	410	$31,035,000	389	$31,309,000	-21	+$274,000
b. Competing...	88	6,210,000	98	6,726,000	+10	+516,000
2. Supplemental......	-	100,000	-	-	-	-100,000
3. New Programs......	16	690,000	-	-	-16	-690,000
4. Scientific Evaluation and Planning...........	(2)	350,000	(2)	350,000	-	-
5. Total Training Grants..........	514	38,385,000	487	38,385,000	-27	-

Training Grants (By type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Graduate.........	486	$37,235,000	486	$38,008,000	-	+$773,000
2. Clinical Training Anesthesiology.	28	800,000	1	27,000	-27	-773,000
3. Scientific Evaluation and Planning...........	(2)	350,000	(2)	350,000	-	-
4. Total Training Grants.........	514	38,385,000	487	38,385,000	-27	-

Training Grants Program Analysis

Program Area	1971 Estimate	1972 Estimate	Increase or Decrease
1. Basic Health Sciences.......	$21,010,000	$21,010,000	-
2. Pharmacology-Toxicology.....	4,000,000	4,000,000	-
3. Bioengineering Sciences.......	2,631,000	2,631,000	-
4. Clinical Sciences	10,394,000	10,394,000	-
5. Scientific Evaluation and Planning...........	350,000	350,000	-
6. Total Training Grants.........	38,385,000	38,385,000	-

Collaborative Research and Development

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	---	---	3	$54,000	+3	+$54,000
Other expenses.........	---	$4,548,000	---	3,553,000	---	-995,000
Total.........	---	4,548,000	3	3,607,000	+3	-941,000

Introduction

The NIGMS research contract program provides a mechanism for the support of targeted research programs designed to achieve a specific objective or to advance a specific direction of research. Although limited in scope, the contract program--through its highly directed approach--provides a complementary research and development effort that enables the Institute to achieve goals that cannot readily be accomplished through regular grant procedures. Areas of needed contract effort are identified by the scientific staff in consultation with scientists from their respective research areas.

Program Plans in 1971 and 1972

Pharmacology-Toxicology

The last quarter-century has witnessed the discovery of many important drugs which have eased the suffering and saved the lives of millions of patients. Many of these drugs, although valuable in a large percentage of the patients to whom they are prescribed, have adverse reactions in a limited number of cases. In addition to the harm and hazard to the patients affected, the occurrence of these adverse reactions may make useless an otherwise valuable drug. It is therefore important to discover these adverse reactions early and to undertake the research needed to discover the possible relationship of these reactions to the particular characteristics of the groups of patients involved, particularly with regard to age, sex, blood grouping, and other genetic characteristics, and to find dosages and approaches to administration that will limit the hazards involved. In some instances redesign of the drug to a less toxic form may be feasible.

In an effort to meet this major health problem head-on, NIGMS for several years has supported a contract effort with Tufts University School of Medicine, in collaboration with six Boston hospitals, aimed at the detection, treatment, and prevention of adverse drug reactions in man. They have computerized their program and now have 8,500 patients under study. Progress to date has been significant. Last year this group reported that among women taking birth control pills those with blood type A have three times as many blood clots in their legs and lungs as those with blood type O. They are now working with other clinical investigators at Tufts and in other research centers to find out why those with type A have the greater clotting tendency. This year this same group of scientists has shown that a new but widely used diuretic substance known as ethacrynic acid, used to stimulate the kidneys to remove excessive fluid from the body, causes serious gastrointestinal bleeding in certain patients when given intravenously. Additionally, the Tufts group has shown that the second most widely used semi-synthetic penicillin, ampicillin, causes an increased incidence of adverse drug reaction as compared with other available and less expensive forms of penicillin of equal effectiveness. The adverse reaction caused by this one particular penicillin not only causes discomfort and prolongation of illness but frequently causes a prolongation of stay in the hospital.

Scientists at the Research Triangle Institute of North Carolina have elegantly refined existing methodology and instrumentation and developed new techniques and methods for isolating infinitesimally small amounts of drugs and drug metabolites (break-down products) of significance to the health of man. During the past year these scientists have found that a metabolite of a very widely used oral contraceptive steroid may result in birth defects of a severe nature in mice. The metabolism of this drug in the human female is currently under study, and the Food and Drug Administration is being kept informed as to their findings. Research on similar steroids, barbiturates, and common pain-relieving preparations is continuing by this group. It has been found, for example, that common forms of barbiturates consist of two similar chemical structures, one of which has greater activity than the other. Techniques for the separation of these isomers are being investigated, and studies on their relative activities will be conducted during the coming year. An amount of $2,000,000 will be used in 1971 and 1972 for pharmacology-toxicology contracts.

Biomedical Engineering and Automated Clinical Laboratories

This Institute, through a variety of mechanisms, continues to provide broad support for the introduction of the principles and practices of engineering science into biomedical research and development. Using these engineering principles, new knowledge arising from the biological and medical sciences is being applied to the development of prototype instruments and devices that will aid in the more precise and accurate diagnosis and treatment of disease. The collaborative research and development program for the automation of clinical laboratories is such an effort.

An overview of the work load of clinical laboratories in the United States has revealed that in 1969 it was approximately one-half billion tests. It is estimated that this number will double within five years or less. Thus, by 1975, these laboratories will be faced with the performance of approximately a billion tests per year, and with a simultaneous requirement that the quality be increased and the cost decreased. The solution of this critical problem is to find ways to mechanize and automate the clinical laboratory.

To help resolve this situation the Institute has directed a large portion of its collaborative research and development effort toward this area. The goal is to develop a totally automated modular laboratory system that can be adapted to benefit all sizes of hospitals from the small community hospital to the large university hospital complex.

The major areas being concentrated on at this time are: clinical chemistry, hematology, microbiology, and urine analysis. Contract support is directed towards the more critical problems found in these areas. Included are accurate methods for the determination of chemicals in blood; easier, rapid and more accurate methods for the assay of enzymes and hormones; and automatic accessioning of biological samples as they appear in the laboratory receiving office. Support in this area will be decreased by $1,000,000 in 1972, providing a total support of $548,000.

Other Contracts

Continued contract support will be provided in the Fundamental Sciences at the same level as in 1971 of $1,000,000.

An increase of three positions and $59,000 will be required to effectively administer the contracts program. This increase is offset by a decrease of $1,000,000 reflecting a total decrease for this activity of $941,000. Special emphasis will be placed in the developing and awarding of contracts in the field of genetics.

Training Activities

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	15	$249,000	15	$266,000	---	+$17,000
Other expenses.........	---	105,000	---	107,000	---	+2,000
Total.........	15	354,000	15	373,000	---	+19,000

This intramural program was established in this Institute in 1966 for the purpose of training outstanding young scientists in pharmacology-toxicology and related areas. The original implementation of the program was at a level of 10 Research Associate appointments with an authorized growth to a level of 30. Personnel and expenditure restrictions have limited this planned growth. Fifteen Research Associates will be supported in 1971 and 1972.

This program will continue at the same level of support as in 1971 with a mandatory increase of $17,000 in personal services and communication costs and $2,000 for payment to the "National Institutes of Health Management Fund" for centrally furnished services.

Review and Approval

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel Compensation and benefits.........	120	$1,724,000	123	$1,895,000	+3	+$171,000
Other expenses.........	---	1,853,000	---	1,951,000	---	+98,000
Total......	120	3,577,000	123	3,846,000	+3	+269,000

This activity provides the supporting professional and clerical personnel required for the planning, review, analysis, and management of the extramural programs of the Institute and supports the National Advisory General Medical Sciences Council.

The increase of $269,000 includes three new positions and $60,000 to provide the additional staff required in the field of genetics, $126,000 for annualization of pay increase, other increased costs and benefits and $83,000 for payment to the "National Institutes of Health Management Fund" for centrally furnished services.

Program Direction

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	56	$887,000	56	$933,000	---	+$46,000
Other expenses.........	---	430,000	---	457,000	---	+27,000
Total.........	56	1,317,000	56	1,390,000	---	+73,000

This activity includes the Office of the Director and supporting professional and administrative staff required to provide the overall leadership necessary for the administration and management of the research effort of the Institute.

The mandatory increase of $73,000 includes $46,000 for personal services, $15,000 for increased communication costs and $12,000 for payment to the "National Institutes of Health Management Fund" for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants (Public Health Service Act, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$87,392,000	Indefinite	---	$87,657,000

Purpose: To provide support of research in the fundamental and clinical sciences which relate directly to human health and disease.

Explanation: Regular research grants and large-scaled program projects are made to non-profit institutions and individuals to establish, expand and improve research activities which are germane to the mission of this Institute.

Accomplishments in 1971: In 1971, 1,070 research grants and program projects were supported. Increased emphasis was given to studies of the genetics of desease. We have continued our support and development of pharmacology, automated clinical laboratories and the study of trauma.

Objectives for 1972: It is anticipated that further support will be provided to programs in the fundamental sciences; such as, genetics of disease, cell structure and function, and bioorganic chemistry which are critical to the practical solution of medical problems. The special programs in trauma, pharmacology and toxicology, clinical instrumentation, and biomedical engineering will continue to be supported in areas considered most likely to find application at the clinical level.

Activity: Fellowships (Public Health Service, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$18,454,000	Indefinite	---	$15,142,000

Purpose: Funds are provided annually for postdoctoral and special fellowships, as well as for research career program awards to encourage training not only in the broad spectrum of fundamental sciences but also targeted areas such as biomedical engineering, pharmacology-toxicology and in selected clinical sciences such as anesthesiology, diagnostic radiology and surgery.

Explanation: The Institute's fellowships program provides training to young scientists for careers of teaching and research in the health sciences.

Accomplishments in 1971: In 1971, approximately 1,600 fellows will receive support in leading institutions throughout the Nation. Many former fellows and awardees are now acknowledged leaders in their respective fields and it can be predicted with confidence that from the pool of talented scholars for whom support is currently being provided will emerge many outstanding biomedical investigators and teachers of the future.

Objectives for 1972: In 1972 approximately 1,140 fellows will be supported in the various programs. Continued emphasis will be directed to development in the fields of basic and clinical pharmacology, clinical chemistry, human genetics and trauma.

Activity: Training Grants (Public Health Service Act, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$38,385,000	Indefinite	---	$38,385,000

Purpose: The major purpose of the graduate training grant program of NIGMS is to provide highly skilled medical scientists as well as faculty for the health professional schools of the United States. The development of a broadly based program of medical research and the improvement of the Nation's health care system depend more upon the existence of well-trained manpower than upon any other single factor.

Explanation: The NIGMS research training program is the Nation's most significant Federal program for the training of medical scientists in a diverse array of fields to meet the current and future manpower needs of medical schools, universities, hospitals, and research institutes.

Accomplishments in 1971: In 1971 the program will support 514 grants in the following areas: basic health sciences, pharmacology-toxicology, bioengineering sciences, and clinical sciences.

Objectives for 1972: The Institute will continue to emphasize support of graduate training programs of high scientific merit and demonstrable productivity. The training programs are continually being reoriented to reflect newly emerging manpower demands as well as the development of newer scientific approaches. It is anticipated that committed and planned increases in the medical scientist program will be achieved through gradual decreases in current levels of support in some clinical research training areas. It is estimated that approximately 487 grants will be supported in 1972.

Activity: Collaborative Research and Development (Public Health Service Act, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$4,548,000	Indefinite	3	$3,607,000

Purpose: The NIGMS research contract program provides the mechanism for the support of the total research effort for targeted programs and is utilized to achieve a specific objective or to advance a specific direction of research.

Explanation: Collaborative research and development in the biomedical sciences and supportive areas are conducted by contract with institutions.

Accomplishments in 1971: The NIGMS is engaged in the support of collaborative research and development in the biomedical sciences and supportive areas by contracts. In this program every attempt is being made to get tangible results of research into use in the patient care area. Progress has been made in the identification of previously unreported metabolites of several drugs, including steroids and barbiturates, which appear to cause physiological effects.

Objectives for 1972: This Institute, through contracts, will continue to provide broad support for research and development of the pharmacology-toxicology program, biomedical engineering, and automated clinical laboratories as well as the fundamental sciences with special emphasis on genetics.

Activity: Training Activity (Public Health Service Act, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
15	$354,000	Indefinite	15	$373,000

Purpose: This intramural program was established in this Institute in 1966 for the purpose of training outstanding young scientists in pharmacology-toxicology and related areas.

Explanation: The original implementation of the program was at a level of 10 research associate appointments with an authorized growth to a level of 30. Personnel and expenditure restrictions have limited this planned growth. Fifteen research associates will be supported in 1971 and 1972.

Accomplishments in 1971: In 1971, this activity will support the training of 15 young scientists in pharmacology and toxicology, thus reinforcing strongly the total National Institutes of Health research effort.

Objectives for 1972: In 1972, this Institute will continue to support and train the same number of research associates as in 1971.

Activity: Review and Approval (Public Health Service Act, Title IV, Part E)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
120	$3,577,000	Indefinite	123	$3,846,000

Purpose: This activity provides the staff for the planning, review, analysis, and management of the extramural programs of the Institute and supports the National Advisory General Medical Sciences Council.

Explanation: The extramural program supports a broad base of fundamental and applied biomedical research and training activities aimed at the solution of certain major health problems.

Accomplishments in 1971: A total of 1,584 research and training grants and 1,600 fellowships were funded in 1971. The professional and supporting staff effectively maintained surveillance of these 3,184 grants.

Objectives for 1972: In 1972, it is planned to apply a more stringent evaluation of the Institute's programs to insure initiation of research and training grants to new programs of high promise plus full support to programs of productivity and quality.

Activity: Program Direction (Public Health Service Act, Title IV, Part E)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
56	$1,317,000	Indefinite	56	$1,390,000

Purpose: This activity supports the Office of the Director and provides for the overall leadership necessary for the administration and management of the research effort of the Institute as well as staff support for program analysis, finance and information.

Explanation: The National Institute of General Medical Sciences supports a broad base of fundamental and applied biomedical research programs aimed at the solution of certain major health problems. The Institute Director and his staff are responsible for the overall direction, planning, and evaluation of these programs.

Accomplishments in 1971: The Director and his staff provided continuing guidance and surveillance over the research training and grants program.

Objectives for 1972: This staff will continue to assure that the basic and applied programs are closely interrelated to more rapidly carry basic discoveries to full fruition in health care.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Collaborative Research and Development			
Contract Administrator	GS-15	1	$22,885
Contract Specialist	GS-13	1	16,760
Clerical Assistant	GS-5	1	6,548
		3	46,193
Review and Approval			
Health Science Administrator	GS-15	1	22,885
Scientist Administrator	GS-13	1	16,760
Clerical Assistant	GS-5	1	6,548
		3	46,193
Total new positions, all activities		6	92,386

National Institute of General Medical Sciences

STATEMENT OF DR. DEWITT STETTEN, JR., DIRECTOR ACCOMPANIED BY GORDON KLOVEDAHL, EXECUTIVE OFFICER

INSTITUTE RESPONSIBILITIES

Senator Boggs. As far as I am concerned, I would appreciate your telling us briefly what your Institute does and with special emphasis on the collaborative research work you are doing with the Bureau of Standards.

Dr. Stetten. The National Institute of General Medical Sciences has the primary responsibility to support research and training in those sciences which are fundamental to all medicine.

Also, we have the responsibility to support training and research in those fields of medicine which lie within the domain of more than one categorical institute. For example, trauma, injury by accident to the chest, heart, lung, or eye. Trauma becomes general medical sciences business.

Toxicology, which can apply to victims who fall in all of the categories, is our program. But, also, the basic sciences of medicine, including the anatomical, biochemical, physiological sciences, fall on our Institute. As a result of this, we have more than the prorated share of the fellowships and training program. I believe we support about one-fourth to one-half of all the fellows that are supported by NIH.

We support about one-third of all the training grants. We support alomst all of the predoctoral training because most of these are in the basic sciences.

PREDOCTORAL FELLOWSHIPS

Senator Boggs. Have you decided to eliminate the predoctoral fellowships or to what degree have you?

Dr. Stetten. It was an across-the-board decision before I came here that the predoctoral fellowships should be phased out, and over the next 2 years the last of the predoctoral fellowship support will dwindle away.

Dr. Marston. May I comment on the reason for our decision?

Senator Boggs. Yes.

Dr. Marston. We had reached the point where we were receiving a thousand applications, but were making only a hundred awards. We felt that we could not continue that sort of a situation.

Secondly, by the nature of the program, these are fellowships for individuals with very limited experience, and it has been most difficult to accumulate the type of information needed in order to select the best candidate.

For that reason, we feel that it is much better to support predoctoral training under training grants with local decisions being made in regard to who should be selected and who should not. We are not phasing out predoctoral training; we are phasing out the predoctoral fellowships which will be at a level of about $2 million in 1972.

Senator Boggs. By doing that, and not phasing out the predoctoral training, you are not necessarily reducing the manpower and health research?

Dr. Marston. In actual fact, we are to the extent of $2 million. As you will recall, we have a sort of truce on our research training level pending the study on training grants. Because of this, we did not argue that we should offset this $2 million decrease by an increase elsewhere in our training programs. The general intent is to maintain training and fellowships at the current dollar levels until the study is complete. In this case I felt that we had to make a move because we had what I thought was an impossible position of generating large numbers of applications and then being able to award only a small number.

Senator Cotton. This is the same old problem that we have discussed. This involves the matter of bringing along people to take over scientific research in the future?

Dr. Marston. No, sir. I would like to make the point in this particular case—the predoctoral fellowships with national competition. We made this decision on a programmatic basis rather than as a part of the much larger problem of training in general, which still has not been resolved, but which, I think, is most likely to be resolved from our standpoint in the 1973 budget.

Senator Cotton. What are these people destined for?

TRAINING GRANTS

Dr. Marston. This is a small component of the overall training program, if you will, involving the training for people who are working for degrees. Most of these individuals with that goal in mind get that type of training through our training grants. However, a small number have been doing it through a national competition for a fellowship award. It is this latter program element that we are phasing out.

Senator Cotton. I think I understand. Those getting training grants go into the reservoir of people available for the future.

Dr. Marston. Yes, sir; they fall into two categories. The predoctoral, those working for their doctoral degrees, and the postdoctoral, those getting specialized training beyond the Ph. D. or, in some instances, the M.D. degree.

Senator Cotton. What do they do after they have had this training?

Dr. Stetten. Eighty percent or so end up in an academic appointment of one sort or another, teaching and research in many instances in medical schools, in related biological institutes, in hospitals. The overwhelming majority of them end up in such positions. A few escape and get into medical practice or administration.

Dr. Marston. We were looking at some data recently. In an area like physiology—which, of course, is very important in medical education, dental education, and research—about 98 percent of the faculty members that have gone into the field of physiology received training support from NIH at sometime during their training period. So, we are talking about training people who will be the faculties for the future, the investigators for the future, in medical schools and research institutes and industry.

Senator COTTON. If you took that $2 million or even half of it and put it back into the training grants, dollar-for-dollar, you would be getting more for it than where it was going before; is that right?

Dr. MARSTON. I think so. This is the programmatic decision we made.

Dr. STETTEN. We think we get better quality because the selection of the trainee is in the hands of the faculty that will train him. The selection of a fellow is done as a clerical job essentially, a paper judgment here in Bethesda. We do not think it is as good a judgment as the one made at the institution.

Senator BOGGS. There has been no reduction between 1971 and 1972. You had $38,385,000 in 1971 and the same figure in 1972 for training.

Dr. STETTEN. That is right. There is a small reduction in the number of awards. This is the result, really, of a conscious decision to discontinue one group of grants.

Senator BOGGS. Still in the fellowships program you still get $15,142,000; is that correct, $3 million less?

Dr. STETTEN. Yes. Approximately two-thirds of this decrease is attributable to the decline in support of predoctoral fellows.

GENETICS RESEARCH

Senator BOGGS. Thank you. Go ahead.

On the genetics program.

Dr. STETTEN. This was one of the more exciting things that have happened in the last year. It started in these committee hearings, I think largely, testimony, I believe, you heard a year ago from Dr. Joshua Lederberg, and to which this committee and the House committee responded, and this was the $10 million appropriation to which Dr. Marston alluded.

Early in this calendar year, some $7.75 million of this $10 million was released for this purpose.

The task force was set up in Dr. Marston's office under the chairmanship of Dr. Berliner and several institutes were represented. Each institute went into its records and selected the grants which had been applied for and approved but could not be funded, which were in genetics and in genetic diseases. The majority of those had been assigned to our institute which had an avowed interest in this area but there was a scattering in allergy and infectious disease, in arthritis and methabolic diseases, cancer, and child health and human development and one award in neurological diseases and stroke.

A total of 166 awards was made totaling $7.75 million. These were all made to applicants who had secured, by our standards, a very high priority on the merit rating performed by the study sections which review these grants. These were all awards that I believe the participating institutes were happy and proud to see funded.

Senator COTTON. These are scholarships?

Dr. STETTEN. No, sir; these are research grants. I have here a list of them, if you want those in your record.

Senator BOGGS. That would be good for the record. Thank you, Doctor.

(The list follows:)

SUMMARY OF APPLICATIONS ACTIVATED WITH SPECIAL GENETIC FUNDS

Institute	Number	Amount (total costs)
NIGMS	122	$6,169,334
NIAID	19	568,262
NIAMD	8	306,742
NCI	3	107,188
NICHD	13	575,337
NINDS	1	23,137
Total	166	7,750,000

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

GM grant number	Principal investigator and institution	Title	Amount
03934-18	Krivshenko, Jakov D., University of Rochester.	Interation of nonhonologous chromosomes.	$36,568
07779-11	Nanney, David L., University of Illinois	Genetic studies with tetrahymena	145,748
10025-09	Wyckoff, Harold W., Yale University	X-ray analysis of protein structure and function.	137,804
10067-09	Woodward, Dow O., Stanford University	Gene-enzyme relationships in neurospora	48,821
10180-09	Nathans, Daniel, Johns Hopkins University.	Protein synthesis	36,698
10692-09	Anderegg, John W., University of Wisconsin.	Biophysical studies on macromolecules	33,490
10999-07	Lingrel, Jerry B., University of Cincinnati	Mammalion messenger RNA and protein biosynthesis.	31,755
11079-08	Loper, John C., University of Cincinnati	Genetic control of enzyme biosynthesis	32,078
11180-09	Hearst, John E., University of California	Physical chemistry of deoxyribonucleic acid.	135,698
11738-07	Santer, Melvin, Haverford College	Primary structure analysis of ribosomes	18,293
11873-08	Wolfe, Stephen L., University of California	The fine structure of chromosomes	10,230
12589-07	Crothers, Donald M., Yale University	The structure and reactions of nucleic acids.	37,258
13300-06S1	Cotton, F. Albert, Massachusetts Institute of Technology.	Structure of a micrococcal nuclease	171,272
13557-06	Powers, Edward L., University of Texas	Physio-chemical studies on irradiated cells.	183,707
13712-06	Taylor, Austin L., University of Colorado	Bacteriophage-induced mutation in E coli	21,701
13827-06	Kempthorne, Oscar, Iowa State University	Research in mathematics and statistical genetics.	146,380
13914-07	Schumaker, Verne N., University of California.	Macromolecules of circulatory and genetic importance.	82,976
13939-06S1	Sobell, Henry M., University of Rochester	Purine-pyrimidine crystalline complexes	22,096
13970-06	Sager, Ruth, Hunter College	Cytoplasmic genetic control systems	172,974
14644-04	Rasch, Ellen M., Marquette University	Regulation of chromosomal nucleoprotein synthesis.	31,861
14814-04	Malamy, Michael H., Tufts University	Spontaneous mutants of the lactose Operon of E coli.	101,468
15122-04	Marcus, Abraham, Institute for Cancer Research.	Initiation and peptide synthesis in vitro	47,078
15123-04	Menninger, John R., University of Oregon	Control and mechanism of protein chain termination.	27,095
15142-04	Bremer, Hans, University of Texas	In vitro synthesis of RNA	129,955
15225-04	Sigler, Paul B., University of Chicago	Structural analysis of biological macromolecules.	41,630
15278-04	Schmidt, Jean M., Arizona State University.	Stalk development in caulobacter crescentus.	22,599
15381-04	Nierlich, Donald P., University of California.	The regulation of RNA synthesis in escherichia coli.	49,973
15399-04	Maitra, Umadas, Yeshiva University	Enzymatic synthesis of biologically active macromolecule.	41,420
15401-04	Soll, Dieter G., Yale University	Relation of structure to function of transfer RNA.	109,755
15438-04A1	O'Brien, Thomas W., University of Florida.	Characterization of animal mitochondrial ribosomes.	37,884
15539-04	Schimmel, Paul R., Massachusetts Institute of Technology.	Investigations of reactions of physioloical importance.	71,860
15574-05S1	Bailey, Donald W., Jackson Laboratory	Histocompatibility system of the mouse	31,918
15593-04A1	Cann, Howard M., Stanford University	Genetic studies in the Lake Atitlan Basin, Guatemala.	37,598
15691-04	Lucchesi, John C., University of North Carolina.	Genetic regulation in drosophila dosage compensation.	37,101
15751-04	Munkres, Kenneth D., University of Wisconsin.	Molecular genetics of malate dehydrogenase.	47,280
15761-04	Slayman, Carolyn W., Yale University	Genetic study of ion transport in neurospora.	104,021
15882-08	Zamenhof, Stephen, University of California.	Study of the chemistry of the gene	23,056

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

GM grant number	Principal investigator and institution	Title	Amount
15884-07	Mattoon, James R., Johns Hopkins University.	Genetic modification of mitochondria	$51,713
15887-06	Hsu, T. C., University of Texas	Ultrastructure studies on nuclear components.	109,410
15925-04	Yarus, Michael J., University of Colorado	Recognition of TRNA by aminoacyl—TRNA synthetases.	33,585
15934-04	Goldberg, Melvin L., University of California.	Mechanisms of normal and abnormal gene regulation.	65,286
15963-03	Saul, George B., Middlebury College	Nonreciprocal cross incompatibility in mormoniella.	23,090
16059-04	Rudner, Rivka, Hunter College	Macromolecular aspects of synchronous cell division.	27,352
16209-04	Jones, Thomas C., Harvard Medical School.	Cytogenic studies on diseased animals	31,053
17129-01	Noller, Harry F., Jr., University of California.	Ribosome structure and function	51,820
17170-01A1	Orme-Johnson, William, Jr., University of Wisconsin.	EPR and X-ray studies of electron-transfer enzymes.	38,357
17335-01	Novak, Robert L., Depaul University	RNA polymerase and the RNA polymerase reaction.	17,425
17363-01	Zimmerman, Burke K., Johns Hopkins University.	Enzymic synthesis and repair of deoxyribonucleic acid.	94,252
17371-01A1	Arnott, Struther, Purdue University	The geometry of nucleic acids and nucleoproteins.	44,202
17436-01A1	Hill, Walter E., University of Montana	Physical studies of altered ribosomal subunits.	35,299
17446-01A1	Harpst, Jerry A., Case Western Reserve University.	Weak interactions between biological macromolecules.	21,400
17503-02	Gabbay, Edmond, University of Florida	Topography of nucleic acid helices in solutions.	21,638
17538-02	Bauerle, Ronald H., University of Virginia	Mechanism of gene expression and its regulation.	96,409
17658-01	Lee, John C., University of Texas	Ribosomal ribonucleic acids and their precursors.	40,132
17662-01	Weber, Klaus K., Harvard University	Structure and function of RNA-polymerase.	39,914
17673-01	Friedman, Theodore, University of California.	Transformation and transduction of mammalian cells.	47,377
17675-01A1	Kiger, John A., Jr., Oregon State University.	Genetic control of development in drosophila.	43,800
17680-01	Buck, Clayton A., Kansas State University	Factors required for mitochondrial protein synthesis.	12,399
17713-01	Gregg, Thomas G., Miami University	Function of the Y chromosome in drosophila hydei.	24,754
17715-01	Kaney, Anthony R., Bryn Mawr College	Genetic and phylogenetic analysis of cyanophytes.	28,825
17850-02	Woody, Robert W., Arizona State University.	Optical properties of biological marcomolecules.	51,509
17855-02	Bloomfield, Victor A., University of Minnesota.	Hydrodynamic studies of biomolecular structure.	48,690
17857-01	Rosenberg, Miriam R., University of Pennsylvania.	Developmental changes in erythrocyte and sperm proteins.	41,626
17868-01	Andersen, William R., Brigham Young University.	Inheritance of ribulosediphosphate carboxylase activitie.	33,415
17892-01S1	Neidhardt, Frederick C., University of Michigan.	Regulation of bacterial metabolism	21,189
17921-01	Bachvarova, Rosemary F., Cornell University Medicine College.	RNA synthesis during gastrulation of the mouse embryo.	19,767
17924-01	Traut, Robert R., University of California	Robosome structure and function	93,632
17968-01	Stewart, Charles R., William Marsh Rice University.	Control mechanisms in bacteriophage infection.	26,328
17973-02	Brawerman, George, Tufts University	The role of nucleic acids in cell differentiation.	50,701
17995-01	Kedes, Laurence H, Stanford University	Embryonic chromosomal proteins and their RNA templates.	105,742
18012-01	Yeh, Yun-Chi, University of Arkansas Medical Center.	Biochemical and genetic studies of DNA syntheis.	28,866
18014-01	Wolfe, Jason S., Wesleyan University	Regulation of gene expression in synchronized cells.	39,021
18015-01	Gupta, Shri B., Kenyon College	Regulation of chromosome duplication nicotiana hybrids.	29,582
18079-01	Sederoff, Ronald R., Columbia University	RNA synthesis during differentiation	69,372
18080-01	Hillman, Ralph, Temple University	Genetic Translation as a Cellular Control Mechanism.	43,277
18182-01	Bode, Vernon C., Kansas State University	Biochemical studies on the regulation of DNA. function.	92,359
18185-04	Nakada, Daisuke, University of Pittsburgh	Ribosome formation and ribosomal function.	48,440
18186-09	Eisenstadt, Jerome M., Yale University	Control mechanisms of protein synthesis	33,340
18217-01	Shapiro, Bennett M., University of Washington.	Biochemical events in the cell division process.	116,826
18234-01	McNutt, Walter S., Tufts University	Sulfur-containing TRNAS in eucaryotic cells.	41,051

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF GENERAL MEDICAL SCIENCES

GM grant number	Principal investigator and institution	Title	Amount
18236-01	Fernandez-Moran, H., University of Chicago.	Correlated radiobiology and cryo-electron microscope studies.	$46,789
18243-01	Pettijohn, David E., University of Colorado	Factors organizing DNA packaging in the cell.	26,088
18254-01	Sofer, William H., Johns Hopkins University.	Genetic and chemical analysis of alcohol dehydrogenase.	20,712
18256-01	Hickson, Fred T., University of New Hampshire.	Genetic studies of a supercoiled episomal factor.	29,387
18277-01	Schleif, Robert F., Brandeis University	Isolation and action mechanism of arabinose C protein.	31,231
18292-01	Powers, James C., Georgia Institute of Technology.	X-Ray study of enzyme-small molecular interactions.	33,443
18305-01	Webster, Robert E., Duke University Medical Center.	Studies on the ribosome-message complex	43,806
18309-01	Whitfield, Harvey J., University of Michigan.	Control of replication and segregation of episome DNA.	37,163
18310-01	Axelrod, David E., Rutgers University	Physiological genetics of developmental competence.	21,213
18314-01	Klein, Jan., University of Michigan	Polymorphism of murine histoccompatibility-2 locus.	33,083
18329-01	Brussard, Peter F., Cornell University	Population structure, dynamics and genetic variation.	45,559
18348-01	Pitman, Ian H., University of Kansas	Mutagenic mechanisms	20,853
18409-01	Pipkin, Sarah B., Howard University	Genetic aspects of regulation of enzyme activity.	38,186
18421-01	Kohn, Henry I., Harvard Medical School	Mutagens detected by the H-test in mice	121,802
18455-01	Sundarakubgam, M., University of Wisconsin.	X-ray diffraction studies on TRNAS	66,250
18456-01	Roark, Dennis E., Pennsylvania State University.	Biophysical studies of nucleohistones	27,917
18459-01	Hamori, Eugene, University of Delaware	Kenetic study of double helix formation	20,377
18460-01	Campbell, Mary K., Mount Holyoke College.	Tertiary structure of ribonuclease T 1	17,643
18473-01	Yegian, Charles D., University of Colorado	Mcaromolecular synthesis during viral development.	94,842
18476-01	Katz, Eugene R., Research Foundation of SUNY.	Developmental genetic studies on cellular slime molds.	83,674
18480-01	Dorfman, Ben-Zion, Albert Einstein College of Medicine.	Genetic regulatory mechanisms in purine biosynthesis.	59,864
18481-01	Hill, Helene Z., University of Colorado	Gene expression in mammalian cells	39,165
18483-01	Hadwiger, Lee A., Washington State University.	Drugs and gene activation	31,139
18484-01	Paigen, Kenneth, New York State Department of Health.	Analysis of biochemical variants in mice	40,096
18485-01	Smith, P. Dennis, Emory University	Gene conversion in drosophila melanogaster.	32,098
18487-01	Stern, Curt, University of California	Mosaicism and development genetics of drosophila.	16,547
18489-01	Hansen, J. Norman, University of Maryland.	Regulation of RNA synthesis in germinating spores.	27,474
18490-01	MacQuillan, Anthony M., University of Maryland.	DNA-repair and mitochondrial heredity	16,509
18491-01	Burke, Daniel D., University of Illinois	Transcription and translation of RNA in development.	30,141
18494-01	Smith, Oliver H., Marquette University	The repression system of the tryptophan operon.	48,174
18504-01	Johnson, Robert C., Medical University of South Carolina.	Radiobiological effects on recombination of DNA.	19,659
18525-01	Carl, Philip L., University of Illinois	Control of DNA synthesis in escherichia coli.	29,722
18533-01	Gilham, Peter T., Purdue Research Foundation.	Methods for the sequence analysis of DNA.	28,552
18534-01	Jacob, Samson T., Massachusetts Institute of Technology.	Regulation of mitrochondrial RNA polymerase.	29,805
18537-01	Carlson, Peter S., Wesleyan University	New approaches to the genetics of somatic cells.	20,408
18583-01	Shapiro, Robert, New York University	Damage to nucleic acids by bisulfite sulfur dioxide.	94,048
18607-01	Bearn, Alexander G., University of Texas Medical Branch.	Support for the 4th inter-congress of human genetics.	25,000
18627-01	Hoch, Sallie O., Scripps Clinic and Research Foundation.	Tryptophan biosynthesis in bacillus subtilis.	21,319
18628-01	Takahashi, Mark T., Rutgers University	Regulation of threonine sensitive aspartokinase activity.	36,141
18632-01	Voet, Donald H., University of Pennsylvania.	The structures of nucleic acids and related molecules.	22,765
18673-01	Krakow, Joseph S., University of California.	RNA synthesis by azotobacter vinelandii RNA polymerase.	65,203
18936-01	Carlton, Bruce C., University of Georgia	Circular DNA elements in bacillus megaterium.	42,144
	Total		6,169,334

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

AI grant number	Principal investigator and institution	Title	Amount
03093-12	Rosenblum, Eugene D., University of Texas.	Staphylococcal and staphylophage genetics.	$20,667
04479-10	Koerner, James F., University of Minnesota.	Protein synthesis following bacteriophage infection.	37,346
05972-07A1	Landman, Otto E., Georgetown University	Mode of entry of DNA into bacteria	28,714
06581-07	Zubrzycki, Leonard J., Temple University	Macro- and microhomology of escherichia coli.	30,998
08255-04	Kloos, Wesley E., North Carolina State University.	Comparative genetics of micrococci and staphylococci.	24,197
08572-04	Benzinger, Rolf H., University of Virginia	Transfection of E. coli and its applications	41,535
08595-04	Shipp, William S., Brown University	Biochemical genetics of membrane-associated enzymes.	23,410
09869-01	Arlinghaus, Ralph B., University of Texas	RNA synthesis-mengovirus infected tissue culture cells.	21,926
10185-01	Helling, Robert B., University of Michigan	Mutations of regulatory arac gene of escherichia coli.	9,459
10238-01	Center, Melvin S., Kansas State University	DNA metabolism in virus infected bacteria.	35,230
10256-01	Pons, Marcel W., Public Health Research Insitute.	Studies on influenza virus RNA and proteins.	43,044
10297-01	Chang, George W., University of California	Differentiation and aging in nongrowing bacteria.	21,202
10302-01	Moyer, Richard W., Columbia University	Inhibition of viral DNA replication by host cell factors.	25,596
10311-01	Dubnau, David A., Public Health Research Institute.	Bacterial transformation and the cell membrane.	23,122
10318-01	Clewell, Don B., University of Michigan	Mechanism of replication of a bacterial plasmid.	35,945
10327-01	Yount, William J., University of North Carolina.	Genetic control of human antibody response.	50,499
10333-01	Miller, Charles G., Case Western Reserve University.	Biochemical and genetic studies of hydrolytic enzymes.	23,648
10361-01	Nichols, Jack L., Duke University	Nucleotide sequences in viral RNA	47,020
10372-01	Rodkey, L. Scott, Kansas State University	Genetic studies of idiotypic antibodies	24,704
	Total		568,262

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF ARTHRITIS AND METABOLIC DISEASES

AM grant number	Principal investigator and institution	Title	Amount
08575-07S1	Morris, Allan J., Michigan State University.	Protein and nucleotide metabolism in erythroid cells.	$15,985
11823-04	Kammen, Harold O., University of California.	Enzymes and regulation of nucleoside metabolism.	56,689
12581-03	Levin, Alfred P., University of Tennessee	A study of period damage effects of enzyme activity.	33,172
14613-01A1	Erway, Lawrence C., University of Cincinnati.	Developmental interactions of genes and trace elements.	38,462
14755-01	Beutler, Ernest, City of Hope Medical Center.	Diagnosis and therapy of gauchers disease.	46,365
14768-01	Ogur, Maurice, Southern Illinois University.	Models for human metabolic disorders	22,976
14769-01	Blake, Robert L., The Jackson Laboratory.	Inherited diseases of enzyme control in mutant mice.	45,934
14784-01	O'Reilly, Sean, George Washington University.	The physiology of co and zinc in Wilsons disease.	47,159
	Total		306,742

SPECIAL GENETICS FUNDS—NATIONAL CANCER INSTITUTE

CA grant number	Principal investigator and institution	Title	Amount
10055-06	Kozinski, Andrzej W., University of Pennsylvania.	Interaction of viruses with host chromosomes.	$51,282
12133-01	Doudney, Charles O., Albert Einstein Medical Center.	Restoration of the bacterial chromosome from UV-damae.	25,545
12600-01	Rizki, T. M., University of Michigan	Incorporation of budr into DNA and neoplastic growth.	30,361
	Total		107,188

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

HD grant number	Principal investigator and institution	Title	Amount
00588-09	Mellman, William J., University of Pennsylvania.	Biochemical genetics of cultured human cells.	$63,335
04504-01	Nagyvary, Joseph J., Texas A. & M. University.	Total synthesis of KB cell 5S RNA gene	12,702
04846-01A1	Rodman, Toby C., Cornell University Medical College.	Genetic control mechanisms in mammalian development.	31,982
04899-01A1	Dahmus, Michael E., University of California.	Biochemical aspects of gene regulation	38,535
05187-01	Cohen, Malmon M., Childrens Hospital of Buffalo.	Cytogenetic and biochemical studies of X-inactivation.	30,055
05188-01	Murray, Robert F., Jr., Howard University	Chromosomal abnormalities in Afro-American infants.	55,498
05196-01	Shows, Thomas B., New York State Department of Health.	An approach to human development with cell hybrids.	52,740
05271-01	Williams, Curtis A. Rockefeller University	Cytoplasmic Incompatibility Reactions in Neurospora.	23,870
05309-01	Bell Eugene, Massachusetts Institute of Technology.	Gene transfer during differentiation and aging.	48,850
05375-01	Melnyk, John, City of Hope Medical Center	Synthesis of mammalian trisomics	30,335
05504-01	Burdick, Allan B., University of Missouri	Mammalian spermatogenesis invivo and in vitro.	39,331
05523-01	Russell, Elizabeth S., Jackson Laboratory	Analysis of genetic effects on aging	123,130
05651-01	Hecht, Norman B., Tufts University	Regulation of spermatogenesis in mammals.	24,974
	Total		575,337

SPECIAL GENETICS FUNDS—NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND STROKE

NS grant number	Principal investigator and institution	Title	Amount
09524-01	Kasten, Frederick H., Louisiana State University.	Studies on neurons and allied cells in culture.	$23,137

GENETICS RESEARCH

Senator Boggs. What are you requesting this year? That was $10 million for fiscal 1971.

Dr. Stettin. That is in the base. In effect, our genetics research grants which were at a level of $18 million in 1970 are up to $28.5 million in 1971, the year just passed, and we are requesting a total of $30 million in this particular area for the 1972 budget.

So we are continuing to stress this as an area of interest.

Senator Boggs. There is no delay in this? The funds are being obligated as you move along?

Dr. Stettin. Yes, the funds are being obligated. We have been able to pay off as a result of the additional money a considerable share of the approved grants in this area.

Senator Cotton. This is really a study of hereditary diseases?

Dr. Stetten. Hereditary diseases and the mechanisms by which they are transmitted and the exploration of ways in which they can be prevented, or possibly ultimately cured.

Senator Boggs. I think this committee too, felt very strongly, very much interested in this particular subject.

Dr. Stetten. Do I have time to recount a brief anecdote in this area?

Senator Boggs. Sure.

TAY-SACHS DISEASE

Dr. STETTEN. There is a program in the Baltimore-Washington area and another similar program supported by our institute in San Diego in regard to a disease, a relatively infrequent disease, called Tay-Sachs disease. This is exceptionally interesting. One, it is restricted, or largely restricted to a particular ethnic group, the so-called Ashkenazi, the Eastern European Jew. Two, it happens to be uniformly fatal—which gives one a clear end point of what one is trying to do.

As of a short while ago, within the last 2 years, it became possible for the first time to make a diagnosis of the so-called carrier state to identify the individual who carries the genetic trait but does not have the disease because in the carrier a particular enzyme called glucose aminidase is about 50 percent of normal, whereas it is totally lacking in the diseased individual. It has become possible starting by approaching the high risk population in the synagogues of Baltimore and Washington to get blood samples, perform the necessary analysis and identify the carriers.

Now, in many diseases, having done this, you do what is called genetic counseling which means you tell the people what the risks are and they then make their own decisions on marriage and family planning but in this situation we can go one step further. This is one of the 30 or so diseases which can be diagnosed within the mother's uterus in time to discontinue the pregnancy if the infant is diseased. Since the baby, if born, will die within 2 years there is very little moral qualm about recommending abortion under these circumstances.

Furthermore, you can do one thing more, which is actually very important. You can assure the parents, once you have identified a pair of carrier parents and only such a mating can give birth to a diseased child you can assure the parents that if they will keep on trying and keep in touch with the clinic, sooner or later they will have normal babies because statistically three out of four pregnancies will be clinically free of disease, and one in four statistically, will be genetically a completely normal child.

Therefore, this program has a very good selling point to the population. The total number of patients will be small, but it is a situation in which we can see at least the kind of thing that proper genetic information can lead to. It can lead ultimately to the elimination of this disease.

AUTOMATED CLINICAL LABORATORIES

Senator BOGGS. That is very interesting.

Doctor, will you tell us about your collaborative research program on the clinical laboratory tests? I wish you would tell the committee for the record just what that is.

Dr. STETTEN. It relates to earlier exploration by my predecessor, Dr. Stone, and the decision which was made, which was clearly correct, that to an increasing extent modern medical diagnoses will be dependent on laboratory tests and more and more the practicing physician is depending on laboratory tests. These tests conducted in traditional fashion are expensive and when they are numerous they overwhelm the patients or the patient's insurer, and this in effect raises the premium so that the patient bears the load ultimately.

With improved engineering devices available, with computers invading the field of medicine, it was determined to sponsor a program for the development of automated diagnostic laboratory equipment and a number of successes have been reported.

GEMSAEC

The most dramatic of these, in my opinion, is an instrument which was developed as a result of a collaborative research contract with the Oak Ridge National Laboratory by Dr. Norman Anderson and his colleagues, a machine which is called the GEMSAEC. The development is now very largely completed. The machine is in the hands of two industrial companies. One of these in New Jersey called Electro-Nucleonics, is manufacturing a machine which rigidly conforms to Dr. Anderson's specifications. The first of these machines may be seen by you very easily, if you care to, and it is very interesting, in the Georgetown University Hospital where the prototype is housed and is operated by another grantee of ours, Dr. Martin Rubin of that institution. This is a machine which performs in, I think, 3 minutes to 3½ minutes, up to 16 simultaneous enzyme assays on patients, performs these with reproducibility and accuracy of 2 percent and at a cost which is measured per analysis in pennies instead of what was formerly the case, two analyses per day with a probable error of 20 percent and a cost measuring in many dollars.

So today the doctors in this institution and I think shortly in many institutions will feel free to order these laboratory tests in a fashion which was not economically feasible a short while ago.

Senator BOGGS. It sounds like a breakthrough to me.

Dr. STETTEN. This is an extraordinary piece of machinery, very, very ingenious, very innovative in its design. Its ultimate use, I think, has yet to be determined, but it will be useful, I am certain.

COLLABORATIVE RESEARCH WITH THE N.B.S.

Now, as these machines develop, it becomes more important that the several laboratories that use these machines have available very uniform and very pure standard substances for reference, for calibrating the analytical instruments. For every group of analyses that is performed, one or two or three of the chambers are assigned to the standard whose value is known beforehand. On exploration it turned out that good reliable standards are not in general available. For this reason, a contract was entered into, I believe about 1969, with the National Bureau of Standards, first to prepare and to distribute highly purified, very reproducible samples of those materials which were of particular interest to a clinical laboratory, including glucose, potassium, cholesterol, adrenal corticole steroids, there are probably more on the list now. This has been a rather massive undertaking because a degree of purity is demanded by the people in the Bureau of Standards. These are very fastidious chemists.

That was the reason we turned to them. They are now interested in expanding this list of available material. I think this will be a very valuable development, a normal development of this program.

AUTOMATED CLINICAL LABORATORIES AND BIOMEDICAL ENGINEERING

Senator COTTON. You are talking to at least one person who has about the intelligence of a high school sophomore of these matters. What are the diseases or imperfections that this process or mechanism is designed to reveal? Is this a silly question?

Dr. STETTEN. No. A disease such as diabetes, which is a common disease, is diagnosed preponderantly on the basis of laboratory data. The diabetic patient often has minimal history that is relevant and often has few physical signs. The doctors depend on the numbers which come out of the laboratory to which he sends the patient's blood and urine. A final diagnosis of this disease is never made without such information.

Today, in a particular community hospital if you send a blood sample to the laboratory 1, 2 or 3 days may lapse before you get an answer.

Senator BOGGS. It is costly. If you send it to 10 different laboratories for test you may get back 10 different results. That is what this program is attempting to overcome, to have a measurement that is just as good as the weights and measures.

Another example is the mile by which you measure your speedometer.

Senator COTTON. "Doctor" Boggs, I must leave now, but I will get the information from you.

Senator BOGGS. That is precisely what this program is.

Dr. STETTEN. This is what it is designed to do. I have high hopes and my colleagues have high hopes that we are moving in this direction.

May I make another point?

Senator BOGGS. Yes.

Dr. STETTEN. This was brought home to me very emphatically. I was formerly at a medical school in New Jersey. For sentimental reasons, one of my medical faculty and I invited a very distinguished physician to introduce our students the first time we gave the course on the matter of diagnosis. We had Dr. Robert Loeb to come out from New York to give a lecture. It was a wonderful lecture because he is a very wise man. He lectured to these students who were only first or second year students, they were very new at the game on how you make a medical diagnosis. He stressed that you take a history, but you don't just inquire about what symptom brings the patient to you. You take a thorough history. You inquire about the family's history and the patients previous history and all the infectious diseases he may have had as a child, thoroughness is of the essence. Then you do a physical examination. You just don't examine the sore finger, you look at his throat, his ears, eyes, abdomen. Thoroughness is necessary. The third leg of the tripod on which the diagnosis rests is the laboratory. Here Dr. Loeb, who is a man of 72, said you use selected laboratory tests. After he had left, the professor of medicine came to me and said, "He is wrong. You used to use selected laboratory tests because they were expensive, but the reason for that judgment was entirely economical, not medical. What you really should do is to be thorough about laboratory tests for precisely the same reasons that you are thorough about the history of the patient."

I think this is the era we are now approaching, now that laboratory tests can be done cheaper.

Senator BOGGS. I think what you are doing is great in your whole institute. I realize and appreciate the presentation Dr. Marston made this morning on the whole budget picture, but, for example, the committee felt that it might be able to go a little further in this and encourage this kind of work, do you believe it could be done?

Dr. STETTEN. Yes, sir.

Senator BOGGS. I don't want to overencourage things, Doctor, but in something like this, it has convinced me that it needs some encouragement because it has so much dividends, I believe, and benefit to the general public. I don't know whether you have anything to add further to this.

Dr. MARSTON. No. I would not disagree.

SUBCOMMITTEE RECESS

Senator BOGGS. I thank you very much.

The subcommittee will recess and will resume hearings tomorrow at 10 a.m., with NIH, National Institute of Neurological Diseases and Stroke.

(Whereupon, at 5:35 p.m., Tuesday, July 20, the subcommittee was recessed, to reconvene at 10 a.m., Wednesday, July 21.)

DEPARTMENTS OF LABOR AND HEALTH, EDUCATION, AND WELFARE AND RELATED AGENCIES APPROPRIATIONS FOR FISCAL YEAR 1972

WEDNESDAY, JULY 21, 1971

U.S. Senate,
Subcommittee of the Committee on Appropriations,
Washington, D.C.

The subcommittee met at 10 a.m., in room 1223, New Senate Office Building, Senator Norris Cotton presiding.

Present: Senators Magnuson and Cotton.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

National Institutes of Health

National Institute of Neurological Diseases and Stroke

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF NEUROLOGICAL DISEASES AND STROKE

For expenses necessary to carry out, to the extent not otherwise provided, title IV, part D of the Public Health Service Act with respect to neurology and stroke [$105,807,000] *$96,521,000.*

Amounts Available for Obligation

	1971	1972
Appropriation	$105,807,000	$96,521,000
Real transfer to:		
"Departmental management"	-17,000	---
"National Cancer Institute" (proposed transfer for increased pay costs)	-1,879,000	---
"Division of Biologics Standards" (proposed transfer for increased pay costs)	-308,000	---
"National Institute of Child Health and Human Development" (proposed transfer for increased pay costs)	-62,000	---
"John E. Fogarty International Center for Advanced Study in the Health Sciences" (proposed transfer for increased pay costs)	-30,000	---
"St. Elizabeths Hospital" (proposed transfer for increased pay costs)	-26,000	---
Comparative transfer to:		
"Office of the Director"	-67,000	---
"Office of the Director"	-1,088,000	---
"Health manpower"	-2,844,000	---
"Departmental management"	-4,000	---
Total, obligations	99,482,000	96,521,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
211	Research...........	--	$58,802,000	--	$57,492,000	--	-$1,310,000
	General research support grants...	--	(5,027,000)	--	(4,481,000)	--	(-540,000)
	Scientific evaluation and planning	--	(130,000)	--	(130,000)	--	---
	Categorical clinical research centers..........	--	(3,154,000)	--	(3,154,000)	--	---
	Specialized research centers...	--	(840,000)	--	(840,000)	--	---
216	Fellowships........	--	2,782,000	--	2,595,000	--	-187,000
218	Training...........	--	11,456,000	--	11,456,000	--	---
	Direct Operations:						
220	Laboratory and clinical research	252	10,319,000	252	10,572,000	--	+253,000
222	Collaborative research and development..........	165	9,752,000	165	7,831,000	--	-1,921,000
225	Biometry, epidemiology and field studies...........	84	3,482,000	84	3,476,000	--	-6,000
227	Review and aproval of grants	77	2,318,000	77	2,492,000	--	+174,000
227	Program direction	30	571,000	30	607,000	--	+36,000
Total obligations......		608	99,482,000	608	96,521,000	--	-2,961,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions	608	608	--
Full-time equivalent of all other positions	52	52	--
Average number of all employees	633	633	--
Personnel compensation:			
Permanent positions	$ 7,942,000	$ 8,404,000	+$462,000
Positions other than permanent	311,000	426,000	+115,000
Other personnel compensation	213,000	253,000	+40,000
Subtotal, personnel compensation	8,466,000	9,083,000	+617,000
Personnel benefits	731,000	777,000	+46,000
Travel and transportation of persons	418,000	399,000	-19,000
Transportation of things	130,000	124,000	-6,000
Rent, communications and utilities	354,000	338,000	-16,000
Printing and reproduction	171,000	163,000	-8,000
Other services:			
Project contracts	7,667,000	5,567,000	-2,100,000
Payment to NIH Management Fund	5,235,000	5,394,000	+159,000
Other	1,595,000	1,514,000	-81,000
Supplies and materials	1,315,000	1,275,000	-40,000
Equipment	362,000	346,000	-16,000
Grants, subsidies and contributions	73,040,000	71,543,000	-1,497,000
Deduct quarters and subsistence charges	-2,000	-2,000	---
Total obligations by object	99,482,000	96,521,000	-2,961,000

Summary of Changes

1971 estimated obligations	$99,482,000
1972 estimated obligations	96,521,000
Net change	-2,961,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	--	---	--	+452,000
2. Federal Telecommunications System rate increase	--	---	--	+26,000
3. Within Grade Pay costs	--	---	--	+193,000
4. One additional Day of Pay in 1972	--	---	--	+39,000
5. Non-competing Research Grants	--	33,192,000	--	+1,451,000
B. Payment to "National Institutes of Health Management Fund" for centrally furnished services	--	5,088,000	--	+212,000
Total, increases			--	+2,373,000
Decreases:				
A. Program:				
1. Research Grants	--	58,802,000	--	-2,761,000
2. Fellowships	--	2,782,000	--	-187,000
3. Laboratory and Clinical Research	252	6,538,000	--	-83,000
4. Collaborative Research and Development	165	9,244,000	--	-2,100,000
5. Biometry, Epidemiology, and Field Studies	84	3,234,000	--	-100,000
6. Review and Approval	77	1,395,000	--	-50,000
B. Payment to "National Institutes of Health Management Fund" for centrally furnished services	--	5,088,000	--	-53,000
Total, decreases			--	-5,334,000
Total, net change			--	-2,961,000

Explanation of Changes

Built-in increases--These increases will provide $452,000 for annualization cost of the 1971 pay raise effective January 10, 1971; $39,000 for an additional day of pay in 1972; $193,000 for within grade pay increases in 1972; and $26,000 for the increased cost of using the Federal Telecommunications System. The $1,451,000 in non-competing research grants will fund in 1972 those project grants which were funded in 1971 and are being continued in 1972 as a commitment made prior to 1972.

Program decreases--All of the program decreases result from the need to provide funds for special scientific initiative programs.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or to be Taken
1971 House Report	
1. The Committee expressed hope that followup studies of Parkinson patients treated with levodopa and the search for other similar drugs would continue (page 23 of the House Report).	1. The Institute continues intensive research efforts with levodopa in an effort to find the cause of Parkinsonism, to reduce the side effects of the drug, to find a less expensive form of the drug, and to determine the effect of levodopa on diseases similar to Parkinson's disease.
2. The Committee expressed a desire to see as many as possible of the established training grant programs continued until the completion of the training grant study early in Fiscal Year 1972. (page 24 of the House Report)	2. The Institute is making every effort to continue as many programs as possible with the resources available to it.
1971 Senate Report	
1. The Committee expressed a strong desire to see an expanded effort in stroke research, particularly the stroke clinical research center program. (page 41 of the Senate Report)	1. In 1971, the Institute increased the number of project grants investigating stroke, but will not increase the number of stroke centers.
2. The Committee felt that six additional pilot centers on spinal cord injury were necessary in an effort to focus research expertise on the problem of acute spinal cord injury. (page 41 of the Senate Report)	2. The Institute plans to fund the additional spinal cord centers in 1971 and anticipates selecting two of these as full-scale, operational categorical clinical research centers in 1972.
3. The Committee expressed interest in the research on finding a substitute for lost sight and hearing by direct stimulation of the brain. (page 42 of the Senate Report)	3. Efforts will continue in 1972 through contracts to determine the best ways to stimulate the brain and to study the effects of materials implanted in the brain.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act Section 301--Research and Investigations in general............................	Indefinite	$96,521,000
Title IV, Part D--National Institute of Neurological Diseases and Blindness.....	Indefinite	96,521,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in section 301 of the Public Health Service Act.

Title IV, National Research Institutes, Part D, National Institute on Arthritis, Rheumatism, and Metabolic Diseases, National Institute on Neurological Diseases and Blindness, and other Institutes.

"Sec. 431 (a) The Surgeon General shall establish in the Public Health Service....an institute for research on neurological diseases (including epilepsy, cerebral palsy, and multiple sclerosis) and blindness...."

"Sec. 433 (a) Where an institute has been established under this part, the Surgeon General shall carry out the purposes of Section 301 with respect to the conduct and support of research relating to the disease or diseases to which the activities of the institute are directed, through such institute and in cooperation with the national advisory council established or expanded by reason of the establishment of such institute. In addition, the Surgeon General is authorized to provide training and instruction in such institute and elsewhere, in matters relating to the diagnosis, prevention, and treatment of such disease or diseases with such stipends and allowances (including travel and subsistence expenses) for trainees and fellows as he may deem necessary and, in addition, provide for such training, instruction, and traineeships and for such fellowships through grants to public and other nonprofit institutions."

Public Law 90-489
90th Congress, H.R. 12843
August 16, 1968

"Sec. 453. The name of the institute for neurological diseases and blindness is hereby changed to the "Institute for Neurological Diseases."

Public Law 90-639
90th Congress, H.R. 14096
October 4, 1968

"Sec. 7. The name of the National Institute of Neurological Diseases and Blindness is hereby changed to the National Institute of Neurological Diseases and Stroke."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental management.....	$ -17,000	To establish the Facilities Engineering and Construction Agency.
National Cancer Institute...	-1,879,000	Proposed transfer for increased pay costs.
Division of Biologics Standards................	-308,000	Proposed transfer for increased pay costs.
National Institute of Child Health and Human Development..............	-62,000	Proposed transfer for increased pay costs.
John E. Fogarty International Center for Advanced Study in Health Sciences........	-30,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
Office of the Director......	-67,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director.
Office of the Director......	-1,088,000	To provide an equitable distribution of the Management Fund in 1972.
Health manpower............	-2,844,000	Transfer of institutional support funds to health manpower.
Departmental management.....	-4,000	Transfer mental retardation functions to Office of the Secretary.

National Institute of Neurological Diseases and Stroke

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$ 54,100,000	$ 57,624,000	$ 80,000,000	$ 70,812,000
1963	71,206,000	77,506,000	86,506,000	83,506,000
1964	88,407,000	87,675,000	88,407,000	87,675,000
1965	88,608,000	87,889,000	88,089,000	88,089,000
1966	96,403,000	96,403,000	102,153,000	101,153,000
1967	106,418,000	111,296,000	116,296,000	116,296,000
1968	128,633,000	128,633,000	135,633,000	128,633,000
1969	131,195,000	126,674,000	132,674,000	128,934,500*
1970	103,485,000	101,256,000	112,700,000	107,365,000
1971	93,813,000	100,807,000	115,807,000	105,807,000
1972	95,496,000			

*$21,519,000 transferred to National Eye Institute

Justification

National Institute of Neurological Diseases and Stroke

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	608	$ 9,197,000	608	$ 9,860,000	--	$ +663,000
Other expenses.........	--	90,285,000	--	86,661,000	--	-3,624,000
Total	608	99,482,000	608	96,521,000	--	-2,961,000

General Statement

This Institute is concerned with a variety of diseases which afflict the brain and sense organs. Disorders such as cerebral palsy, epilepsy, multiple sclerosis, muscular dystrophy, parkinsonism, and deafness result in long-term disability while cerebrovascular disease (stroke) is the third largest cause of death in this country and a major cause of serious disability. Progress against these inadequately understood diseases would relieve mankind of some of its heaviest disease burdens.

These neurological and sensory disorders fall into 13 major program areas, each subject of a specifically focused research effort. The research effort in these areas is carried out through extramural project research grants, center or program project research grants, intramural research projects, collaborative and field research projects and contract research projects. The program areas are as follows.

The neurological disorders of early life include all those diseases of the nervous system which occur in early life whether they are acute or chronic.

The neurological disorders of adult life are those diseases of the nervous system which manifest themselves late in life, but are chronic and debilitating.

The cerebrovascular disorders include all those disorders of the central nervous system related to blood circulation including stroke, CV functions, blood-brain barrier and angiography.

Epilepsy and related paroxysmal disorders are those conditions in which recurrent seizures require constant medication or treatment, and in some cases surgery. It also includes migraine and headache.

Sclerosing disorders in general include such diseases as multiple sclerosis, amyotrophic lateral sclerosis, allergic encephalitis, and others which are chronic and incapacitating but for which there is no certain cause or treatment.

Muscular disorders are those diseases which involve both nerves and muscles and their interactions. These may occur at different periods of life, but are chronic and, incapacitating, and often fatal.

Infectious diseases are all those diseases caused by known infectious agents whether bacterial, viral, rickettsial, fungal, or other.

Trauma and injury to the nervous system include all those physical agents which can accidentally cause injury to the nervous system.

Tumors of the nervous system include all the neoplastic growths which occur within the confines of the nervous system and include the metastatic tumors of the nervous system which originate elsewhere in the body.

Neuroendocrine Studies. This category includes also studies on the autonomic nervous system, including control of body temperature, micturition and respiration.

Neural Aspects of Learning and Behavior. Studies of the brain tissues and complex nervous system in regard to sensory and motor behavior, such as perception, memory, learning, and locomotion.

Nervous System Studies related to normal functions. This includes the subcategories of anatomy, physiology and pharmacology in their applicability to normal functions. (For example, a study of the molecular structure of biological systems, or the metabolism of nervous and related structures.)

Sensory disorders include three areas, disorders of hearing and equilibrium, speech and other higher CNS functions, and disorders of other senses.

The Institute maintains an overview of all the program areas through special task forces, Advisory Council Subcommittees, and its scientific information network now centered in two of the Nation's strongest university libraries and research laboratories. These facilities have been developed to advise the Institute staff of research needs and current progress.

From the outset, the use of focused and directed research efforts has been a major part of the Institute's program. The program for the identification and testing of new anticonvulsant drugs is a good example of this kind of activity. The longest study of this type is the Collaborative Perinatal Project, which is now in its thirteenth year. Other cooperative and collaborative studies are in progress and a major segment of direct research is devoted to the direction and coordination of these investigations, frequently using the contract mechanism.

Faced from the outset with a critical shortage of highly specialized scientists required for neurological and sensory research, the Institute has devoted approximately 20 percent of its grant funds to the training of personnel, although this has receded to about 15% for 1972. Former trainees form an important segment of developing programs, such as the newly established stroke centers. The expanding number and size of medical schools are increasing the manpower demands from our training programs.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research Projects........	$49,651,000	$48,887,000	$ -764,000
Special Programs.........	9,151,000	8,605,000	-546,000
Total Research Grants....	58,802,000	57,492,000	-1,310,000

Introduction

The research grant programs of the National Institute of Neurological Diseases and Stroke include research projects, research program projects, outpatient clinical research projects, clinical research centers, and, in the cerebrovascular and head and spinal cord injury areas, specialized research center grants. The primary objectives of these grant programs are the identification, stimulation, and support of essential research on problems related to the diagnosis, treatment, and prevention of diseases of the nervous system, the neuromuscular apparatus, the ear, and human communication. Some of these diseases are among the major causes of death in the United States (stroke, head injury, and spinal cord trauma) and of permanent disability (paralysis, epilepsy, deafness, loss of speech). They include diseases of the young (cerebral palsy, epilepsy, deafness, aphasia), of adults (head injury, paraplegia, multiple sclerosis, deafness) and of the aged (stroke, brain tumor, parkinsonism, otosclerosis and other forms of degenerative deafness, pre-senile and senile dementias).

Program Plans for 1971 and 1972

In 1971, approximately 1,267 regular research projects totalling about $49,651,000 will be awarded by the Institute. It will be possible to continue many of the ongoing projects and to initiate a limited number of new projects of special quality and importance. The program will continue emphasis in the fields of stroke, parkinsonism, epilepsy, brain and spinal cord injury, deafness, and loss of speech. New programs at pilot levels will be directed towards special efforts in the neurological and sensory disorders as outlined in the following areas of research emphasis.

Research Project Grants

The importance to the mission of NINDS of some 1,166 regular research projects cannot be overemphasized since they constitute the major part of the extramural research program. They represent the ideas and approaches of the individual, independent scientists in laboratories and clinics throughout the nation. Some studies are largely clinical; others are effective and essential combinations of clinical and basic research. Many are fundamental studies on the important basic mechanisms by which cells, genes, protein molecules, and other fundamental biological entities reproduce and function in the nervous system. This information is vital to finding new approaches to the cause, treatment and prevention of diseases of the nervous system and human communication. Building upon this broad base of independent research, the Institute is establishing special projects and programs directed toward specific categorical objectives. In this way the most effective attack on each of the Institute's disease problems is being developed and maintained.

Disorders of Human Communication
(Hearing, Language, and Speech)

Other than prevention, the prime public health needs with respect to communicative disorders is their early identification and management. If action is taken soon enough, such disorders are correctable by medical and surgical remedial measures followed by proper training and education. Therefore, it is especially important that they be diagnosed as early as possible before they become so firmly established that corrective measures will have limited effectiveness.

Clinical research centers and outpatient clinical research programs have been established to provide for comprehensive research programs on the development of improved methods of diagnosis and treatment of these communicative disorders. The centers are multidisciplinary and include experts in many aspects of human communication. Major developments in the detection, diagnosis, therapy, and natural history of communicative disorders are being perfected in them.

The development of improved instrumentation and sensory aids will be encouraged. In no other area is the participation of the engineer and the physicist more important for the design of mechanical and electronic aids. Every effort will be made in FY 1972 to maintain the present level of research in these crucial areas.

Epilepsy

Epilepsy is recognized as a major national health problem. It is generally estimated that there are at least one and a half to two million epileptics in the United States. However, because of the social stigma and unfavored economic and insurance position of epileptics, no reliable data are available about the true prevalence of this disorder. The economic burden in direct and indirect costs is probably well over one billion dollars a year. Despite a good deal of special attention over the past several years, progress has not been rapid in the areas of drug therapy, surgical treatment, electroencephalography, or basic research. This is true even though reasonably good experimental animal models are now available for laboratory studies.

Epilepsy has many manifestations and expert opinion differs on its cause or causes. Some believe that all forms of epilepsy arise from a single disease entity. Others feel that certain common mechanisms of neuronal discharge may occur in all cases, but that the specific etiologic chemical, anatomical, or functional defect may vary widely. At the present time most seizures can be controlled, but not cured.

The Institute's program is built on a broad base of individual research project grants to scientists representing many disciplines in many laboratories. Studies on the structure, chemistry, and function of the normal brain are also essential to provide the firm base on which the abnormal brain can be examined. Basic studies on normal and epileptic brain tissue can be expected to provide significant advances in such areas as neuroanatomy, neuropharmacoloby, neurochemistry, neurophysiology, and central nervous system circuitry that may underlie the basic mechanisms of the epileptic discharge. This requires sophisticated electronic and microchemical instrumentation. Such investigations will lead to the development of more effective anti-convulsant compounds and a better understanding of the disease process. As a corresponding program, the Institute has supported an important contract effort on drug therapy. This is explained in the collaborative budget activity.

Parkinsonism

It is now clear that levodopa (levodihydroxyphenylalanine) will revolutionize the treatment of Parkinson's disease. Clinical trials of this amino acid have demonstrated considerable relief of disabling symptoms, including rigidity, akinesia, and tremor. This is gratifying news to the over 1,000,000 people in the United States who are afflicted with this crippling disorder for which there was no effective form of therapy.

This breakthrough does not mean that the research effort on parkinsonism can be reduced. On the contrary, research must be accelerated because levodopa provides us with a tool to explore the cause of the disorder, and hopefully, its prevention. For the first time, hope is available that the riddle of this cruel disorder and other related diseases such as Huntington's chorea and Dystonia Musculorum Deformans may be solved.

In regard to the clinical use of levodopa, research is underway to improve the drug and to follow up the new approaches to parkinsonism. The drug must be taken in large amounts, is very expensive, and the side effects frequently are very unpleasant if not dangerous. The immediate problem being worked upon is altering the drug chemically or synthesizing a similar compound which will be at least as effective in treating parkinsonism but will be less expensive, more palatable and without side effects. Most important of all, perhaps, the discovery of the effectiveness of levodopa may make it possible to elucidate the fundamental defect in parkinsonism and to devise an even more satisfactory program of prevention and therapy.

Acute Head and Spinal Cord Injury
(Accident and Injury)

The incidence of spinal cord injury as a result of both civilian and military activities is increasing. These injuries, often resulting in paraplegia, have disasterous consequences for the victim, his family, and the community. Although on-going, but financially limited research programs are already in existence, an intensified national effort is essential.

More information is necessary especially concerning the immediate damage in the injured spinal cord. Preliminary data suggest that if the acute injury is promptly and properly treated, permanent damage may be prevented. Therefore, the development of methods of treatment of the acute injury is of great importance. Greater efforts are needed to develop instrumentation to utilize still viable muscles even though long tracts of the spinal cord have been damaged. Again, this is an area where the multidisciplinary approach of neurological scientists, biophysicists, and engineers is essential.

As a result of modern machines of peace and war, both the frequency and severity of head injuries also are increasing. The Institute continues to intensify its attack on the medical aspects of this problem through the establishment of clinical research centers in order to provide a firm base for the important combination of clinical material, laboratory facilities, and experienced researchers. Much fundamental research is underway on the basic mechanisms of reaction to head injury. These studies increase the importance of providing clinical research centers to relate the findings in the laboratory to the problems of the patient.

Presently supported groups continue to direct their efforts to such problems as brain swelling after injury, the physiological and metabolic consequences of head injury, the physical forces involved in brain damage, the structure and function of the blood-brain barrier, and the evaluation of new diagnostic and therapeutic procedures in the management of head injury.

Despite the great need, however, this research area has not moved ahead rapidly. Institutions with superb clinical material may not have the other requisites for a clinical research center. Consequently, eight specialized research center grants have been awarded to develop head injury clinical research centers. Additional institutions must be supported in their plans to develop centers and it is hoped that some of the groups presently under development will show sufficient progress in the near future to warrant support as a full scale head injury clinical research center. Also, in 1971 six grants amounting to $300,000 will be awarded for feasibility studies on the development of spinal cord injury clinical research centers to evaluate whether there is sufficient knowledge and scientific opportunity for further research in this field to justify an expanded effort. If these studies prove successful, it is planned to establish two fully operational spinal cord injury centers in 1972 estimated to cost $150,000 each.

Stroke

Stroke continues to be one of the three leading causes of death and disability, frequently occurring during the victims' most productive years. Survivors often suffer life-long physical disability and/or mental incapacity.

Studies are desperately needed to insure more effective treatment of stroke by devising means to anticipate and prevent complete obstruction of cerebral vessels, and to supplement or replace vessels diseased beyond repair. Fundamental research on the cerebral blood vessels of laboratory animals and on regional and cerebral blood flow continue to provide the information which is essential prior to undertaking similar studies in man.

The main thrust of the Institute's attack on the stroke problem continues to be through the stroke clinical research centers, seventeen of which are presently supported. Through the specialized research center programs, several of the present centers were first supported through a developmental phase. Some institutions did not have all of the essential resources required to justify a full scale center, but did have the potential for such development if given assistance.

Continued support of basic laboratory research also is essential to complement the clinical research center program as it provides the laboratory experimental base from which techniques applicable for human research are developed.

Support must be continued for the carefully designed national cooperative studies of the surgical and medical treatment of aneurysms and of the efficacy of drugs for the prevention of stroke due to hypertension. These are long term studies initiated several years ago and will be continued over the planned period. There is increasing evidence that anti-hypertensive therapy is effective in preventing stroke in moderate hypertension as well as in severe hypertension. Research on this subject will be developed as rapidly as possible. The area of patient care will also be of considerable interest. During 1971 increased research emphasis will be directed towards more effective methods of care of the acute stroke patient.

Other Program Areas

The areas of primary emphasis mentioned above represent only a few of the more than 200 diseases known to afflict the brain and sense organs. Other areas of special importance are: sclerosing disorders of the nervous system, muscular and neuromuscular disorders, infections and viral diseases, tumors of the nervous nervous system, and studies related to the normal function of the nervous system.

Research Grants Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
I. Neurological Disorders.....	($37,735,000)	($37,240,000)	($-495,000)
A. Neurological Disorders of Early Life............	6,000,000	5,900,000	-100,000
B. Chronic Neurological Disorders of Aging.....	2,220,000	2,180,000	-40,000
C. Cerebrovascular Disorders	5,755,000	5,755,000	---
D. Epilepsy and Related Paroxysmal Disorders...	2,430,000	2,390,000	-40,000
E. Sclerosing Disorders.....	2,590,000	2,540,000	-50,000
F. Muscular & Neuromuscular Disorders.............	4,970,000	4,890,000	-80,000
G. Infectious Diseases......	320,000	315,000	-5,000
H. Trauma and Injury........	3,150,000	3,150,000	---
J. Tumors of Nervous System.	690,000	680,000	-10,000
M. Neuroendocrine Studies...	2,850,000	2,800,000	-50,000
N. Neural Aspects of Learning and Behavior..........	1,210,000	1,190,000	-20,000
P. Nervous System Studies related to Normal Function	5,550,000	5,450,000	-100,000
II. Sensory Disorders..........	(11,470,000)	(11,283,000)	(-187,000)
A. Disorders of Hearing and Equilibrium...........	6,400,000	6,290,000	-110,000
B. Disorders of Speech & Other Higher CNS Functions...	1,430,000	1,413,000	-17,000
C. Disorders of Other Senses	3,640,000	3,580,000	-60,000
III. Multi-Categorical..........	4,440,000	4,358,000	-82,000
Subtotal..............	53,645,000	52,881,000	-764,000
IV. Scientific Evaluation......	130,000	130,000	---
V. General Research Support Grants................	5,027,000	4,481,000	-546,000
VI. Total Research Grants......	58,802,000	57,492,000	-1,310,000

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Non-competing.....	871	$33,192,000	861	$34,643,000	-10	$+1,451,000
2. Competing renewals	256	10,873,000	228	10,458,000	-28	-415,000
3. Supplementals.....	(110)	1,175,000	(110)	1,175,000	-	---
4. New..............	140	4,411,000	77	2,611,000	-63	-1,800,000
5. Subtotal Regular Program.........	1,267	49,651,000	1,166	48,887,000	-101	-764,000
6. General Research Support.........		5,027,000		4,481,000		-546,000
7. Scientific Evaluation		130,000		130,000		---
8. Categorical Clinical Research Centers		3,154,000		3,154,000		---
9. Specialized Research Centers........		840,000		840,000		---
10. Total	1,267	58,802,000	1,166	57,492,000	-101	-1,310,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Fellowships.......	$2,782,000	$2,595,000	$-187,000

Introduction

The research fellowship program of the Institute is designed to encourage physicians and laboratory scientists to acquire the specialized research training and experience essential for careers as teacher-investigators in the neurological and human communication sciences. This includes specific areas such as stroke, acute head and spinal cord injury, epilepsy, hearing impairment, and speech and language disorders. The research fellowship program includes Postdoctoral Fellowships and Research Career Development Awards.

Postdoctoral Fellowships

The Postdoctoral Fellowship Program of the Institute provides financial support for scientists who have recently completed doctoral (Ph.D. or M.D.) preparation and who desire additional research training in highly specialized health and health related research areas. These individuals frequently become authorities in their research areas. During 1972 emphasis will be given to training in fields relevant to laboratory and clinical research on problems of cerebral vascular disease, epilepsy, parkinsonism, speech and language impairments, deafness, and vestibular disease.

More than a decade of experience indicates that the Postdoctoral Fellowship Program of the Institute has proven highly effective in meeting its objectives. A significant number of research scientists whose projects are currently being supported by NIH Research Grants received their professional preparation under this program.

Research Career Development Award Program

Research Career Development Awards provide stipend support during a five year period for the most brilliant young scientists who have completed all or nearly all of their formal research training and who desire and require additional research experience prior to assuming positions of scientific leadership. RCDA's enable scientists to become established as independent investigators in selected areas of research. The awards are especially important for clinician-researchers who are able for the first time during their training to develop the experience essential for an academic and research career for which they have a long prior period of clinical preparation. Many more such individuals are needed who can combine extensive knowledge in one or more of the basic sciences with first hand clinical experience in the neurological and communicative impairments.

Program Plans for 1972

Funds requested for 1972 will provide for 123 fellowship awards, compared to 135 in 1971, a decrease of 12.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting........	73	$2,020,000	73	$2,020,000	--	--
2. Competing renewals..	44	575,000	33	400,000	-11	$-175,000
3. Supplemental........	(39)	32,000	(39)	32,000	--	--
4. New.................	18	155,000	17	143,000	-1	-12,000
5. Total fellowships...	135	2,782,000	123	2,595,000	-12	-187,000

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Postdoctoral........	45	$ 366,000	42	$ 339,000	-3	$ -27,000
2. Research career:						
a. Career.........	12	356,000	12	356,000	--	--
b. Development....	78	2,060,000	69	1,900,000	-9	-160,000
3. Total fellowships...	135	2,782,000	123	2,595,000	-12	-187,000

Training Programs

	1971 Estimate	1972 Estimate	Increase or Decrease
Total training grants......	$11,456,000	$11,456,000	--

Introduction

The Extramural Training Grant and Traineeship Programs of the Institute have as their primary objective assisting training institutions in the recruitment and training of academicians, teachers, clinical and basic scientists, and community health leaders for careers in the fields of neurological and communicative disorders and stipend support of selected trainees during the period of training. The Institute has the responsibility for providing the resources necessary for training the individuals who will become future teachers responsible for training physicians and scientists who will develop the advances needed for understanding, preventing, and successfully treating diseases and disorders of the nervous system and the problems of human communication. From these training programs emerge our leading academicians, teachers, and medical scientists.

Graduate Training Grants

These grants are awarded on a competitive basis to institutions and organizations providing training in the disciplinary areas related to neurological or communicative disorders. The primary objective of these grants is the training of teacher-investigators, scientist-physicians, and community health and public health personnel in the specialty, discipline, or field for which the grant is made.

Teacher-Investigator Special Traineeships

The Teacher-Investigator Program, now in its second year, offers the most competitive and prestigious training and development award made by the Institute to an individual. The award provides support for the clearly superior individual who has a high potential for an outstanding academic career. This support bridges the gap between a postdoctoral period of study and a secure academic appointment. The T-I award provides a continuing five-year period of support for the development of future academicians. Awards are primarily for those who are identified as having potential as opposed to those who have already demonstrated superior achievement.

Special Traineeships

Special Traineeships are awards to individuals who have completed at least three years of postdoctoral training or research experience. The program provides the financial support required by scientists, particularly clinical scientists, who are interested in becoming highly qualified in the diversity of essential research skills in areas such as neuroanatomy, neurophysiology, neuropathology, neurochemistry, neuropharmacology, audiology, otolaryngology, speech pathology and biophysics. Such skills are critical to advances in solving neurological and communicative disease problems or, more important, preventing such problems. Scientists must continually update their skills as knowledge advances in their specialized areas and in related areas and they must acquire competence in the utilization of new techniques and instrumentation.

Program Plans for 1971 and 1972

The Institute will continue to train teachers and researchers in areas involving the nervous system and human communications, as it has in the past. The demand for such personnel continues to increase as a result of the establishment of new medical schools and the increasing requirements for highly skilled personnel. Funds requested for 1972 will provide for 351 awards compared to 365 in 1971, a decrease of 10 Graduate Training programs and 4 traineeships.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting..........	162	$ 7,118,000	149	$ 6,784,000	-13	$-334,000
2. Competing renewals.....	135	3,134,000	143	3,650,000	+8	+516,000
3. Supplementals..........	(56)	328,000	(35)	244,000	(-21)	-84,000
4. New....................	68	741,000	59	643,000	-9	-98,000
5. Scientific evaluation..	(3)	135,000	(3)	135,000	--	---
6. Total training grants..	365	11,456,000	351	11,456,000	-14	---

Training Grants (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Graduate...............	208	$ 9,536,000	198	$ 9,536,000	-10	---
2. Traineeships...........	157	1,785,000	153	1,785,000	-4	---
3. Scientific evaluation and planning.........	(3)	135,000	(3)	135,000	--	---
4. Total training grants..	365	11,456,000	351	11,456,000	-14	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	252	$ 4,103,000	252	$ 4,353,000	--	+250,000
Other expenses..........	--	6,216,000	--	6,219,000	--	+3,000
Total.................	252	10,319,000	252	10,572,000	--	+253,000

Introduction

The intramural research activities of the Institute are directed toward a broad program of investigation concerning the basic characteristics of the nervous system and its diseases. Supporting this program effort are three branches and eight laboratories with a personnel staffing at the end of 1970 totaling 225.

Program Plans for 1971 and 1972

In 1971 and 1972 the Institute's basic and clinical research in neurological disorders will encompass both ongoing and new projects. During this period it is estimated that 160 research projects will be conducted. The following are among the most important:

A careful theoretical study of a new approach to laminar tomography and design of improved apparatus was conducted in collaboration with Case Western Reserve University. The principles of design and its optimization were tested in a bench model. A fully operative instrument which will promise a significant advance in the diagnosis of cerebral tumors and cerebrovascular lesions is under construction.

Emphasis will be maintained on research in neurochemical disorders, particularly in familial lipidoses. These poorly understood, devastating, and untreatable neurological disorders of genetic origin have recently begun to yield to biochemical investigation so that much progress in this area is expected over the next few years.

Emphasis will also be given to clinical research in neuromuscular disorders since new methods of treating disorders such as Refsum's disease, hypokalemic periodic paralysis, dermatomyositis/polymyositis, and myasthenia gravis have been found. A new system of classifying neuromuscular diseases continues to provide clues to differential diagnosis--a skill which will become increasingly important as treatment regimens for more of these disorders become available. New surgical approaches to diseases of the basal ganglia and hydrocephalus are being developed.

Basic studies using animal models provide many opportunities to make important advances in our fundamental knowledge of disease mechanisms as well as normal physiological processes. Chronic embolization of the blood stream of rabbits has produced muscle pathology essentially identical to progressive pseudo-hypertrophic muscular dystrophy. Evidence suggests that this type of MD, traditionally thought to be a primary disease of the muscle itself, is rather a disorder of the small blood vessels.

After extensive observation of head injury and whiplash in lower primates, a theoretical model of head injury has been developed which provides for a scaling relationship to man. It is believed that extrapolation to man is possible and further study of the pathogenesis of head injury is planned.

Major efforts will continue in basic studies. For example, studies are being conducted to understand how trophic factors in nerves influence the structure of the muscles to which they connect; to learn the nature of the blood brain barrier, the parameters controlling vascular permeability in the brain, and the aging of neurons and glia; and to elucidate the neurophysiological mechanisms involved in sensory systems, motor action and integration within the central nervous system.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	165	$2,180,000	165	$2,319,000	--	$ +139,000
Other expenses..........	--	7,572,000	--	5,512,000	--	-2,060,000
Total................	165	9,752,000	165	7,831,000	--	-1,921,000

Introduction

This activity includes (a) the Special Projects Branch (Head and Spinal Cord Injury, Epilepsy, and Cerebral Death), (b) the Perinatal Research Branch, and (c) the Sensory Prosthesis program.

Program Plans for 1971 and 1972

The planned collaborative programs for 1971 and 1972 will emphasize the following research.

Head Injury

The two major contractors on the head injury model construction program have completed testing of the material properties of the human and animal head. Two smaller studies are underway of the mechanical properties of the head-neck junction and the dynamic material properties of cerebral blood vessels. One of the principal contractors is currently engaged in an in-depth review of all data collected and analysis of that data for the presentation of a definitive final report on the material properties of the tissues of the head.

The field survey of 875 head-injured veterans of the Korean Campaign and 121 noninjured controls has been completed. Interview data on employment patterns, post-traumatic symptoms and post-traumatic epilepsy, obtained by field workers of the American Red Cross Service to Military Families, have been analyzed by the National Research Council Follow-up Agency. The National Research Council has prepared a final report. When editing and review of this final report are completed, it will be published as either an NINDS or National Academy of Science publication.

A classified bibliography of head injury and related topics is prepared and issued quarterly to interested neuroscientists.

Epilepsy

A program to further the development of new anticonvulsant drugs has been a major thrust of the Institute's epilepsy program. Staff efforts in programming and coordinating projects has been augmented by an NINDS Ad Hoc Committee on Anticonvulsant Drugs. During 1970 and in 1971, priorities have been established for the investigation of promising new drugs. Projects are underway for the clinical testing of two experimental new drugs and for a systematic clinical trial of ethosuximide, an established drug utilized in the treatment of petit mal epilepsy which is to be used as a standard against which new drugs will be compared.

In an effort to improve communication from basic and clinical investigators studying the many facets of the problem of epilepsy, a multi-phase program has been implemented. Publication of Epilepsy Abstracts, a monthly abstract journal, has been continued. Retrospective Epilepsy Abstracts--1947-1968 has been published and distributed to recipients of Epilepsy Abstracts. Preparation of an annotated bibliography of epilepsy from 1900-1950 has begun. Basic Mechanisms of the Epilepsies, the proceedings of an Institute-sponsored symposium, were published in January 1970. Efforts to automate the epilepsy data base, made possible through the Epilepsy Abstracts effort, have proved successful. The major priority for 1972 will be continued investigation of promising anticonvulsant compounds. Technical communication projects beyond the new developmental stage which have proven their value will become self-supporting or transferred to other support.

Cerebral Death Research

In FY 1971 the Institute, recognizing the problems of defining cerebral death, prepared to launch a study which will hopefully provide sufficient data to allow individual institutions to develop operational criteria for cerebral death. This effort is important in that an increasing number of deeply comatose patients' lives are pointlessly being maintained by extraordinary measures, an expensive process in terms of money and manpower. The ability to define carefully the occurrence of cerebral death in a comatose patient will be of great assistance to the attending physician, the institution providing care, and the patient's family. In addition, these criteria will be most important in determining whether or not it is justifiable to remove organs for transplantation.

Sensory Prosthesis Research

The ultimate aim is to develop devices using suitable sensors, data processors, and stimulating electrode arrays implanted against the brain of a blind or deaf person to permit the subject to abstract meaningful information from his environment. Five contracts for preliminary studies were awarded in 1970 and an additional three in 1971 totalling $400,000. Efforts will continue in 1972 to determine the best way to stimulate the brain in humans and experimental animals to determine if this can be done safely and to study the effects of the implanted materials on the brain and of the body fluids upon implanted electronic devices. This information is of utmost importance in the design of sensory prosthesis for the blind or the deaf. FY 1972 efforts will continue at the same level for this program.

Collaborative Perinatal Project

The program is a comprehensive prospective investigation of events and complications of pregnancy which arise before and around the time of birth and which are suspected to contribute to neurological disorders such as cerebral palsy, intellectual deficits, learning and reading disorders, epilepsy, and congenital malformations in children. Observations on some 60,000 pregnancies were made during the years 1959 through 1965 at 14 collaborating major medical centers distributed through the United States. Currently the major emphasis is on the follow-up of children from these pregnancies to age 8. The seven-year follow-up examination includes a neurological, psychological and visual screening examination, and an evaluation of the socio-economic environment in which these children grow up. At eight years, there is a detailed assessment of speech, language, and hearing function. These evaluations at age 7 and 8 are designed to identify specific neurological problems including those subtle deficits of the central nervous system, such as learning disabilities and minimal brain dysfunction, the etiology of which is for the most part unknown.

As indicated by the summary table for this entire budget activity, there is a net decrease in the 1972 funding level of $1,921,000. This consists of a plus $145,000 for mandatory increases (1971 pay act, within grade pay increases, federal telecommunications cost), $34,000 to the "National Institutes of Health Management Fund", and a decrease of $2,100,000 from the collaborative perinatal project.

To enable this project to reach its basic goals, at the decreased level of funds available in 1972, several adjustments and deletions to segments of the program will be made.

Initially a downward adjustment of 25% will be applied to data collection from the twelve collaborating institutions which constitute the "core" of the program.

Analysis of the data collected by these institutions will be limited to the central objectives of the program. This is the association of pre- and perinatal problems with neurological and intellectual deficits of children. The number of task forces planning and guiding this analysis will also be decreased.

The excellent quality control program of the study which provides for investigators of one institution to review the findings of investigators at others will be decreased to half of the present rate.

The sample maintenance concerned with the retention rate of children for examinations at age 7 and 8 will be reduced, but every effort will be made to maintain essential elements in the data collected and still continue the same quantity and quality of effort. The exploration of infections as possible causes of fetal abnormalities will be restricted to those 10 or 15 agents which are highly suspect of causing these adverse effects.

Biometry, Epidemiology, and Field Studies

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	84	$1,337,000	84	$1,412,000	--	+75,000
Other expenses..........	--	2,145,000	--	2,064,000	--	-81,000
Total..............	84	3,482,000	84	3,476,000	--	-6,000

Introduction

The organizational structure of this activity includes the Epidemiology Branch, the branch conducting studies of slow viruses and their relation to neurological disorders, the Office of Biometry, and the Neurological Information Network.

Program Plans for 1971 and 1972

Program Plans presently focus on a continuation of activity already begun. The Epidemiology Branch will place emphasis on continuing studies which show promise of producing understanding of the pathogeneses of such unremitting and inevitably fatal diseases as amyotrophic lateral sclerosis and parkinsonism-dementia. Investigations into climatic conditions, genetic composition of the population, and immunologic abnormalities as factors in the incidence of diseases such as multiple sclerosis, torsion dystonia, amyotrophic lateral sclerosis, parkinsonism and stroke will continue as major activities. The program on chronic disorders of the central nervous system has already shown that certain nervous system diseases may have a virus infection as their etiology and the search will continue to see if this same factor is involved in similar neurological diseases. As an aid to this search, attempts will be made to find more animal models that could have utility in studying human nervous system diseases and the character of the infectious agent. The Neurological Information Network has developed an effective system for the prompt exchange of information in the medical and scientific communities, and these efforts will continue and the Office of Biometry will continue its mathematical and statistical assistance to the Institute's staff and to the Collaborative Perinatal Project in particular.

Following is a detailed description for each program area.

Epidemiology

Epidemiologic studies will be carried out on a broad range of neurological disorders. Studies of patients with amyotrophic lateral sclerosis (ALS) and parkinsonism-dementia (PD) on Guam, where the incidence of these diseases is high, have demonstrated that the unusual pathological changes that occur in the brains of these patients also occur in Guamanians who do not show clinical evidence of these diseases. Such findings favor an environmental factor being the cause. Biochemical studies have suggested that the ALS and PD seen on Guam may be responsive to treatment with drugs of the dopamine series. Therapeutic trials of levodopa are underway and, on initial review, appear promising.

Studies of multiple sclerosis (MS) have indicated that the disease occurs more frequently in cold climates. Migration studies recently completed reveal that those born in warmer low-risk areas are protected against MS even after migration to higher risk areas; while the incidence of the disease in those born in high-risk areas is slightly diminished after migration to a lower risk area.

Central Nervous System Studies

Research will continue in the highly successful study of slow, latent, and temperate virus infections of the central nervous system. The disease kuru, the first chronic degenerative neurological disorder to be experimentally transmitted from man to animal was for a time the only such disease known to be capable of acting in this way; furthermore the only animal model that had been used successfully was the chimpanzee. In subsequent continued studies, spongiform encephalopathy also known as Creutzfeldt-Jakob disease, and pre-senile dementia, a related disease occurring in the United States, have been successfully transmitted to the chimpanzee, and both diseases have now been transmitted to other primates--the squirrel monkey, the Capucin monkey, and the spider monkey. Some progress has been made in the characterization of the viruses responsible using the primate laboratory animals, and attempts to grow these viruses in tissue cultures. Several viral agents have now been isolated in tissue cultures from human central nervous system and muscle tissues of victims of chronic encephalopathies, amyotrophic lateral sclerosis, and polymyositis. A virus agent from the brain of sheep with Montana sheep disease has been isolated and shown to be related or identical to Visna, a virus caused demyelinating degenerating disease of the brain of sheep in Iceland. These discoveries have stimulated further more specific tissue culture and virus studies.

Neurological Information Network

Within this budget activity, the Institute supports the national Neurological Information Network. This network in 1970 and 1971 facilitated the prompt exhange of information within the medical and scientific community through information centers in universities having outstanding library facilities. These are the Information Center for Hearing, Speech, and Disorders of Human Communication at Johns Hopkins University and the Brain Information Service at the University of California at Los Angeles.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	77	$1,168,000	77	$1,238,000	--	+70,000
Other expenses........	--	1,150,000	--	1,254,000		+104,000
Total........	77	2,318,000	77	2,492,000	--	+174,000

Introduction

The Extramural Programs administers the Institute's grant and award programs in support of medical research and training in the neurological and communicative disorders. Research grants, program project grants, research center grants, training grants, fellowships, and traineeships, are programmed, examined, processed and administered by the professional, administrative, and clerical staff of the Institute's Extramural Program. Advice on technical merit and program significance are provided by organized and ad hoc bodies of non-governmental authorities in the health and science fields, including the National Advisory Neurological Diseases and Stroke Council, training review committees, clinical center-program project review committees and study sections of the Division of Research Grants, National Institutes of Health.

Program Plans for 1971 and 1972

Management's expanding need for access to multiplex data and its comprehensive analysis to provide a firm base for program planning, evaluating and reporting, demands a fully automated information system capable of being adjusted to changing requirements. Such a system is being established and will permit a more refined assessment of institute support patterns and needs in research and research training in neurological and communicative disorders.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	30	$409,000	30	$437,000	--	$+28,000
Other expenses........	--	162,000	--	170,000		+8,000
Total........	30	571,000	30	607,000		+36,000

This activity supports professional and administrative direction of the Institute's activities. The Office of the Director provides for the centralized supervision, coordination and review of these programs, as well as for the direction of the administrative functions of finance, personnel, supply, travel, space utilization and management analysis.

Program Purpose and Accomplishments

Activity: Research Grants

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$58,802,000	Indefinite	--	$57,492,000

Purpose: This program supports the development and implementation of broad programs and projects of research on disorders of the brain, special senses, and human communication.

Explanation: The method most frequently used is the research project grant to support the independent investigator. Also, program projects or clinical research center grants are awarded when complex clinical problems, such as research on stroke or on head and spinal cord injury, require the support of a multidisciplinary team within a single institution.

Accomplishments in 1971: In 1971, 1,256 grants will be awarded. Of these, 871 will be continuations and 385 will be competing awards.

Objectives for 1972: The estimate for 1972 provides for 1,166 awards, a decrease of 90 from 1971. Greater emphasis will be placed on research into stroke, spinal cord injury and speech and hearing.

Activity: Fellowships

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$2,782,000	Indefinite	--	$2,595,000

Purpose: The research fellowship programs are designed to encourage physicians and laboratory scientists to acquire the specialized research training and experience essential to prepare them for careers as teacher-investigators in the field of neurological disorders, including stroke, acute head and spinal cord injury, epilepsy, and disorders of hearing, speech, and human communication.

Explanation: The program provides the financial support scientists must have in order to become highly qualified in the diversity of essential research skills, such as neuroanatomy, neurophysiology, neuropathology, neurochemistry, neuropharmacology, audiology, otolaryngology, speech pathology, neuro-otology, biophysics, all of which are critical to advances in solving the neurological and communicative disease problems. More than a decade of experience indicates that the fellowship programs have proven highly effective in meeting these objectives.

Accomplishments in 1971: In 1971 it is estimated that 135 fellowships will be made, including 45 postdoctoral awards, 12 research career awards and 78 research career development awards.

Objectives for 1972: The 1972 estimate would provide for 123 fellowship awards, 12 less than 1971.

Activity: Training Grants

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$11,456,000	Indefinite	--	$11,456,000

Purpose: The training grants program, graduate training grants and traineeships assist, as their primary objectives, training institutions in the recruitment and training of academicians, teachers, clinical and basic scientists, and community health leaders for careers in the field of neurological and communicative disorders, and to provide stipend support to selected trainees.

Explanation: Graduate training grants are awarded on a competitive basis to institutions and organizations providing training in disciplinary areas related to neurological, sensory, or communicative disorders. Traineeships provide individual stipend support to basic or clinical scientists who desire highly specialized training in these same disciplines.

Accomplishments in 1971: In 1971 an estimated 365 awards will be made including 208 graduate training grants and 157 traineeships.

Objectives for 1972: The estimate for 1972 provides for 351 awards, a decrease of 10 graduate training grants and 4 traineeships.

Activity: Laboratory and Clinical Research

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
252	$10,319,000	Indefinite	252	$10,572,000

Purpose: The intramural research activities of the Institute are directed toward a broad program to investigate the basic characteristics of the nervous system and its diseases.

Explanation: Supporting this program effort are four branches and eight laboratories. The following are in the Clinical Research area: Medical Neurology, Surgical Neurology, Electroencephalography, and Neuro-otology. Under the Laboratory Research area are: Neuropathology and Neuroanatomy, Biophysics, Neurochemistry, Neurophysiology, Molecular Biology, Experimental Neurology, Neural Control, and Perinatal Physiology.

Accomplishments in 1971: Several promising new therapies were developed for treatment of epilepsy, and understanding the burst of abnormal electrical activity of brain cells during the epileptic seizure. In the Laboratory Research area, advancement in knowledge has been obtained of the structure of the nervous system and interpreting basic abnormal changes, the blood-brain barrier and its functions, and the chemical organization of the brain and nerves.

Objectives for 1972: The Institute's basic and clinical research in neurological and communicative disorders will comprise both ongoing and new projects. These projects will include research in the field of cerebral trauma, particularly head injury. Emphasis will also be given to the experimental production of head injury in primates and in formulating mathematical models of whiplash injury. Also included are research in the field of muscular disorders.

Activity: Collaborative Research and Development

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
165	$9,752,000	Indefinite	165	$7,831,000

Purpose: This activity supports many of the most important categorical research programs conducted by investigators in collaboration with other Federal institutions and non-Federal institutions largely through contracts.

Explanation: This activity includes the Special Projects Branch (Head Injury, Spinal Cord, Epilepsy, and Cerebral Death), the Perinatal Research Branch, and Special Programs of the Institute such as sensory prosthesis research. This research tends to be more specifically goal-oriented in nature than that supported through grants.

Accomplishments in 1971: Research emphasis was on Head Injury, Epilepsy, and the Perinatal Research Projects. The study of 875 head-injured veterans of the Korean Campaign and 121 non-injured controls was completed and resultant interview analysis has shown the effects from employment patterns, posttraumatic symptoms and posttraumatic epilepsy. Research contracts were awarded for continued studies of the anticonvulsant properties of ethosuximide (Zarontin) for treatment of epilepsy. The major emphasis in the perinatal project is on the follow up of children to age 8. Also, the program for experimental research directed toward a useful substitute for vision and hearing was continued.

Objectives for 1972: The research emphasis will continue to be on Head Injury, Epilepsy, and the Perinatal Research Projects. Also, programs will continue to be directed towards evaluating the feasibility of development of a sight substitute for blind people.

Activity: Biometry, Epidemiology, and Field Studies

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
84	$3,482,000	Indefinite	84	$3,476,000

Purpose: This activity provides for the conduct and support of epidemiological and biometrics research, and clinical trial studies to seek knowledge of the causes of neurological and sensory health problems.

Explanation: The Office of Biometry furnishes the Institute's staff with computer and biometrical formulas and concepts in the Institute's extramural, collaborative, and clinical programs. In the Epidemiology Branch, studies of the incidence and prevalence of a wide range of neurological disorders are underway. This activity also supports the Institute's significant studies relating to the causes of neurological and sensory disorders from infection to slow viruses.

Accomplishments in 1971: Epidemiology studies were carried out on a broad range of neurological disorders including parkinsonism, multiple sclerosis, and therapeutic trials of levodopa. The central nervous system studies continued the highly successful research of slow, latent, and temperate virus infections of the central nervous system. Among the research accomplishments has been the ability to transmit certain diseases to other primates as well as the chimpanzee.

Objectives for 1972: Program plans presently focus on a continuation of activity already begun. The Office of Biometry will continue its mathematical and statistical assistance to the Institute's staff. The Epidemiology Branch will place emphasis on continuing studies which show promise of producing understanding of the pathogeneses of such unremitting and inevitably fatal diseases as amyotrophic lateral sclerosis and parkinsonism-dementia. The program on chronic disorders of the central nervous system has already shown that certain nervous system diseases may have a virus infection as their etiology and the search will continue to see if this same factor is involved in similar neurological diseases.

Activity: Review and Approval

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
77	$2,318,000	Indefinite	77	$2,492,000

Purpose: This activity supports the administration of the Institute's grants and award programs in support of medical research and training in the neurological and communicative disorders. The activity also includes the Office of Program Analysis which maintains an overview of all the program areas of the Institute.

Explanation: Research grants, program project grants, research center grants, training grants, fellowships, and traineeships, are programmed, examined, processed and administered by this activity.

Accomplishments in 1971: The development of the Extramural Program Data Analysis and Report Section has provided a base for data storage and retrieval and program analyses. Advice on technical merit and program significance was provided by organized and ad hoc bodies of non-governmental authorities in the health and science fields.

Objectives for 1972: Maintain the same level of administrative support as furnished in 1971 with emphasis on the refinement of the extramural reporting system.

Activity: Program Direction

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
30	$571,000	Indefinite	30	$607,000

Purpose: This activity supports the professional and administrative direction of the Institute's activities.

Explanation: The Office of the Director provides for the centralized supervision, coordination, and review of all the Institute's programs, as well as for the direction of the administrative functions of finance, personnel, supply, travel, space utilization, and management analysis.

Accomplishments in 1971: Maintained a high level of efficiency in providing services as outlined in paragraph above.

Objectives for 1972: To continue to provide administrative services and make improvement where required.

National Institute of Neurological Diseases and Stroke

STATEMENT OF DR. EDWARD J. MacNICHOL, JR., DIRECTOR

ACCOMPANIED BY:
DR. ELDON L. EAGLES, DEPUTY DIRECTOR, NINDS
ECKART WIPF, EXECUTIVE OFFICER, NINDS

BUDGET REQUEST AND 1971 APPROPRIATION

Senator Cotton. The subcommittee will be in order.

The chairman will be here later. He is on the floor of the Senate. He has a bill that he is sponsoring. It is 15 minutes on the side so he will probably be here in about a half hour. We have so many witnesses before we can write up this bill he even let a Republican preside.

We continue this morning with the National Institutes of Health.

We will hear next Dr. MacNichol, Director of the National Institute of Neurological Diseases and Stroke.

For the record, Doctor, your 1971 comparable appropriation was $99,482,000.

The 1972 budget estimate is $96,521,000, a decrease of almost $3 million.

Dr. MacNichol, you may proceed to give us a brief summary of the purposes of this Institute and tell us about the decrease and what it does to you.

Dr. MacNichol. With your permission, then, I will present a brief summary of our program.

Senator Cotton. You do not have a statement you want to put in the record?

Dr. MacNichol. I would like to put this in the record, if I may.

Senator Cotton. This summary?

Dr. MacNichol. Yes.

Senator Cotton. But you are going to read it to me.

Dr. MacNichol. Yes.

Senator Cotton. I meant, do you have any prepared statement?

Dr. MacNichol. Only the statement that was presented to the House.

Dr. Marston. No. We don't have any prepared statement.

Senator Cotton. Well, if you have anything, you may file it.

Dr. MacNichol. Thank you.

RESPONSIBILITIES OF NINDS

The diseases with which our Institute is concerned are a major national concern not only because stroke ranks third as a killer, but because most of them, including nonlethal strokes, seriously handicap their victims over a long period of time and make these individuals a burden to themselves, their families and to the community. This is particularly true of stroke, Parkinsonism, multiple sclerosis, spinal cord injury, and deafness. Incidentally, the deaf are our largest group of handicapped.

Minimal brain disfunction resulting from defects in early development is probably responsible for a large percentage of crime, drug addiction and alcoholism, school dropouts, and unemployment. Thus, medical solutions to some of our most pressing social problems may exist.

In order to develop ways of preventing and curing these serious disorders, NINDS must maintain its research and training programs. Training is particularly important since the funds made available are used to interest talented young people in working on our problems, and to acquaint them with our special needs. To maintain high-quality clinical teaching departments in otolaryngology, neurology and neurosurgery in which the training of those who will teach these specialties and advance the treatment and prevention of disease, clinical research and training programs must be continued and strengthened. Training programs that do not have our support tend to teach their specialties as they are now, rather than emphasize the development of new and improved methods.

These are a few highlights of our current programs:

In our intramural program, a great advance has been made in diagnosing the so-called lipid storage diseases of which Tay Sachs disease is the most prevalent.

Senator COTTON. Wait a minute.

Excuse me. Will you tell a neophyte, a layman, what that is?

Dr. MACNICHOL. This is one disease in a group of hereditary disorders which results from an accumulation of fatty material in the brain. In each disorder, a specific enzyme which breaks down the fatty material is missing. The specific enzyme has been identified in at least six of these diseases.

The tests for adult people who carry the genetic disorders have been worked out so that potential parents know whether their offspring are likely to have the diseases. Also, tests of the fetus in utero can be made to determine whether the unborn child has the disease.

Senator COTTON. Does it show up in childhood?

Dr. MACNICHOL. Yes it does. These diseases are usually fatal or very severely handicapping. At present, prevention of pregnancy or its termination is the only means of dealing with these diseases now at our disposal. These are great advances which have only recently been made; but in addition we must find means of overcoming the genetic defects that are responsible for the disease.

A study of cerebral death has been organized and will start this fall. The purpose is to test proposed criteria of brain death to make sure that they protect the patient who can recover but do not prolong life unnecessarily, using badly needed facilities and exhausting family resources.

A study to determine whether or not acute spinal cord injury research centers are feasible is being launched. Grant applications for this purpose are being reviewed and six of the studies will get under way in 1972. One very promising lead in developing effective treatment for spinal cord injury was reported to the American Neurological Association symposium here in Washington last month. To many of us, this paper dealing with neurochemistry of certain effects of acute spinal cord injury was the highlight of the meeting. It gives us some real hope of research progress relating to spinal cord injury.

We are looking also into the feasibility of setting up stroke acute care research centers. Present intensive care units are most successful for cardiac patients, but it is evident that quite different things need to be measured and controlled in stroke patients than in coronary dissease. A major effort in defining the factors that favor recovery and those who oppose it, is badly needed to develop strategies for the best management of the disease.

Senator COTTON. Could I interrupt you there?

Dr. MACNICHOL. Yes.

TESTIMONY OF SENATOR CRANSTON

Senator COTTON. We on this subcommittee, I think you know, are your friends. When the going gets rough in the Senate, we have to sometimes come to your defense. Now, you can give us some ammunition right here before you leave the stroke centers.

Senator Cranston from California, who is interested in this bill, appeared before this committee. If you haven't noted his testimony, I want to quote this and I would like to have you give us information in reply to explain it.

Senator Cranston said: "Last year this committee—meaning this committee—"directed that $12 million be utilized to develop 10 additional clinical stroke centers. Only one center has progressed to the talking stage and the already existing centers have suffered a 10-percent reduction."

Now, would you care to comment on that statement at this point or would you prefer to file something at this point that will throw some light on this, I am sure, very sincere allegation that Senator Cranston has made?

Dr. MACNICHOL. I think it might be best if we filed something so that we can give you a very clear answer.

(The information follows:)

Although the Senate voted an appropriation of $115,807,000, of which $12,000,000 was for stroke, the final apportionment of $103,485,000 did not permit the initiation of the 10 new stroke centers envisioned. Further, the 1972 President's Budget of $96,521,000, a decrease of $6,964,000 from the 1971 apportionment, will not permit the initiation of new centers because of insufficient funds to carry them as continuing commitments.

MYASTHENIA GRAVIS

Dr. MACNICHOL. One of our intramural scientists has developed an improved therapy for myasthenia gravis that is considerably more successful than anything else that has been tried. It has taken some patients out of the hospital and allowed them to care for themselves.

Steady and impressive progress has been made in the study of delayed effects of virus infection of the brain. The infectious agent in Jakob-Creutzfeldt disease, which slowly destroys the brain, has been transmitted not only from humans to large primates, but also from these to small monkeys, making the disease much easier to study. Intensive studies are being made also in animal models. Similar diseases affecting sheep have been shown to infect mink, and the virus of one of these animal diseases has at last been tentatively identified. However, we are still a long way from developing effective treatment for this class of diseases and we only know how two of the human diseases of this type are acquired. One of these is Kuru, in New Guinea, and results from cannibalism. The other is Subacute Sclerosing Panencephalitis (SSPE), a rare disease of children which slowly destroys the brain. It has been shown to be due to the long-delayed effects of an incomplete measles virus. Finding this virus and inducing it to grow in tissue culture was a major breakthrough. It introduced a whole new concept in studying brain disease—that of incomplete viruses which do not have the immunological properties of ordinary viruses which permit detection and mobilize the body's defenses.

Further work in our Surgical Neurology Branch has shown that inoculating the brain of young animals with a common chicken virus causes a similar incomplete virus to be produced that will not infect other animals of the same species but which regularly causes malignant brain tumors in the host animal.

This work on incomplete viruses makes it seem probable that at least some forms of such diseases such as presenile dementia, Parkinsonism, multiple sclerosis, amyotiopic lateral sclerosis, epilepsy, myasthenia gravis, and brain cancer may be caused by the delayed effects of viruses which have become so altered that they have thus far been undetected.

To sum up——

PRIMATE CENTER INVOLVEMENT

Senator MAGNUSON. Before you do that, Doctor, we had some testimony here about the primate centers and the animal centers.

What is the connection with research?

Do you use the center at a university or do you have your own?

Dr. MACNICHOL. Most university departments that are doing medical research have animal facilities of one sort or another. Some of these are large primate centers.

Senator MAGNUSON. I think we have not over seven or eight primate centers; something like that.

Dr. MACNICHOL. Yes. These are centers which are completely devoted to the use of primates for research.

Senator MAGNUSON. Do you use those or do you give a contract or grant to that particular place to do some work for you?

Dr. MARSTON. I believe you are thinking of the primate centers supported from our research resources appropriation. Dr. Bowery is the director of that program for NIH in our Division of Research Resources. He will testify later.

Senator MAGNUSON. Research resources, is that where you run them through?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. But you don't have a primate center out at NIH proper?

Dr. MARSTON. We do not have a primate center at NIH proper.

Senator MAGNUSON. You have some animals out there.

Dr. MARSTON. We have some animals at the Bethesda campus and we have the NIH animal center at Poolesville, Md., where we have large animals.

Senator MAGNUSON. Mainly you contract out to a university or a college?

Dr. MARSTON. Yes, sir, except we use the grant mechanism rather than contests. NINDS has, in addition, some animals for experimentation in intramural research programs at Patuxent, Md.

Dr. MACNICHOL. Yes. At the Patuxent Wildlife Research Preserve Center, at Laurel, Md.

Senator MAGNUSON. You do some experiments on the wildlife preserve?

Dr. MacNichol. It is part of the Department of Interior. It allows us to use some of their facilities.

Senator Magnuson. You have nothing to do with the condition of animal centers, have you?

I ask this question for Corinne and myself, Corinne Stevens. You know Corinne Stevens?

Dr. Marston. Yes, sir.

We are very much involved in that.

Senator Magnuson. I mean on the humane side.

Dr. Marston. We are asked for the funds to provide improvements in animal care facilities. These amount to very substantial sums. We are all on the side, of course, of humane treatment of all animals used in biomedical research.

Senator Magnuson. I think since we started with that bill I had 5 or 6 years ago there has been a great improvement in all these centers, sanitation care and all the things that go with it.

Dr. Marston. Yes.

Dr. MacNichol. NIH has an excellent primate building on the NIH farm at Poolsville, Md. It is one of the best facilities I have seen of that kind.

Senator Magnuson. Before you get to your conclusion, L-Dopa has been working, has it not?

Dr. MacNichol. Yes.

Essentially, the results of the preliminary investigations that we analyzed in three institutes have held up. However, we do know that about 25 percent of patients of L-Dopa get spectacularly better. Another 50 percent show some or marked improvement. Another 25 percent show no improvement or develop such serious side effects that the drug has to be discontinued.

Senator Magnuson. In that field, you have a cut from $2.9 to $2.4 million.

Do you feel you have gone far enough that you can sustain that cut?

Dr. MacNichol. I would like to see as much work as can be supported done in this field because I think it is a very promising one. Work is going on in several ways. First of all, scientists are looking for compounds that have similar effects to L-Dopa but which do not have——

Senator Magnuson. The point I have to make—we will have to make this decision—I don't think we should cripple this program if it is showing the kind of results we hear about in any way.

Dr. MacNichol. I believe it is a very promising program.

Senator Magnuson. We have one Senator who will give you some living testimony on it.

That is a decision we are going to have to make on that; $2.9 million was last year and this year you propose $2.4 million. Those are our figures, is that right, in the L-Dopa program? It is a breakdown in the Institute for that program.

Dr. MacNichol. With the decreases in research grants, this is about the percentage that L-Dopa programs will be reduced.

PERINATAL STUDY BUDGET REDUCTION

Senator MAGNUSON. The same thing is in the perinatal study. You got a cutback there from $7.6 to $5.5 million.

Dr. MACNICHOL. That is correct, sir.

Senator COTTON. We had some pretty strong evidence from the outside witnesses around the country on this study.

Do you feel that if I asked you, I know you have to stand by the budget, but do you feel that you are doing justice to it?

Dr. MACNICHOL. As Dr. Marston said yesterday, this is a matter of priority. This reduction was made in relation to all NIH's needs. There is no question about it, if we had these funds there are a lot of things we would like to do in this area.

STUDY FUNDING ALLOCATION

We have, if you would like to have it for the record, a breakdown of just what the effects of the cut will be and how we plan to spend the remaining money in this area. I think that we have budgeted it about as well as we can hope to do. The contractors who are carrying out the study have been very cooperative in trying to make every dollar go as far as it possibly can.

Senator MAGNUSON. I think we would like that for the record. We have to establish priorities up here, too.

Dr. MACNICHOL. Yes.

(The breakdown follows:)

EFFECT OF BUDGET REDUCTION

What will be the effect of $2.1 million reduction in the budget of the Collaborative Perinatal Project?

The various cuts will have a serious impact on the Program as a whole. Nevertheless, we hope in view of the fact that these cuts have been carefully and tactfully negotiated, that their adverse impact on the Project will be minimal.

Data collection is nearly completed. By the end of fiscal year 1975, the remaining one-third of the total cohort of children under study will have completed the battery of tests known as the seven and eight year follow-up examinations. During the last two years, a major effort has been launched to make a systematic and long-range analysis of the complete data base thus far processed and available on magnetic tape. This mass of information has been collected on approximately 60,000 women from 12 different research centers in the country and on approximately 50,000 of their children conceived during 1959–1965 and completely followed with successive examinations in a variety of disciplines throughout the first four years of life. Twelve ad hoc Task Forces made up of a variety of professional experts from within the Project and outside, have been established and charged with the responsibility, under the auspices of the National Institute of Neurological Diseases and Strokes (NINDS) and the Perinatal Research Committee (a group of top expert non-government scientists) to analyze the data and prepare manuscripts and monographs for their publication after the necessary reviews and clearances.

In the midst of this full-fledged ongoing activity in data collection and analysis, the Project had to incur specific budget cuts in line with the overall Federal effort to meet the fiscal needs of national economy, and to provide for certain other, but not NINDS, initiatives. These cuts will have an impact on the following program areas.

1. At the Perinatal Research Branch, the study of congenital infections will be slowed down. We realize this to be unfortunate in view of the growing awareness of the importance of such studies.

2. Despite the momentum already gathered by the availability of a comprehensive data base and by the establishment of various Task Forces for data

analysis, the latter effort will be definitely limited but would nevertheless remain compatible with the expectations of the scientific community and with the morale of the investigators already involved and actively participating.

3. At the level of the local Collaborating Institutions, the effort to analyze local data in depth has been curtailed in all Institutions. The effort previously invested in monitoring and maintaining the quality of data will have to be reduced. The effort focused at sample maintenance will not be augmented and sample retention will be reduced. Undoubtedly, many more children will be lost to the study because of the expense of following up those who have moved and who live far away. While the budget cut is understandably expected to have its adverse effect on the morale of personnel on the job, every effort has been made to minimize the effect of sudden dismissal of personnel, engendered by the cut, on the ongoing level of initiative and of performance. However, it is inevitable that some important people are being let out now, and more will certainly leave.

4. Most significantly, many major studies which had been planned will not be pursued due to the cuts. The following are a number of studies based upon leads already evident from analyses of core data from the Perinatal Project.

a. Relationship between maternal weight gain during pregnancy and the weight of the baby—to be investigated by a primate nutrition study now under development jointly with NICHD.

b. Relationship of spastic diplegia to short gestation or to true prematurity, editorialized in the journal of Developmental Medicine and Child Neurology (April 1970, Vol. 12, No. 2)—a new finding awaiting further exploration by additional neuropathological studies on available brain specimens as well as by additional studies in neurochemistry.

c. Relationship of maternal factors, such as diabetes and acetonuria, to intelligence—an exciting new lead discovered by preliminary analyses and warranting considerable exploration and expansion based on findings from the current intensive analysis of the total data base.

d. The relationship between neonatal infection and mode of delivery. Controlled clinical trials are needed to ascertain whether or not Caesarean section could prevent congenital herpes, for instance.

e. The relationship of maternal factors such as proteinuria to intelligence—an exciting new lead derived from a retrospective study sponsored by the project, confirmed by the prospectively collected data, awaiting further analysis of collected sera for amino acid determinations, to correlate blood chemistry with I.Q.

f. The relationship of estrogen therapy during pregnancy to the development of congenital heart disease in the child such as transposition of heart vessels. In cooperation with NHLI, the unique reservoir of information available in the project on congenital heart disease has revealed for the first time incidence figures on large samples of whites and Negroes, as well as information in the natural history of congenital heart disease.

g. The relationship between maternal diabetes and congenital heart disease in the offspring—an exciting finding points to a risk factor which warrants further exploration to guide preventive action.

h. An exploration of possibility of identifying a third type of twinning, in addition to the known mono- and dizygotic twinning.

The requests from non-project as well as project scientists seeking the utilization of the project data base continue to increase and include the following:

1. A request by an eminent geneticist is currently being considered to collect dental cast impressions on the 7-year-olds in the study with a view to assess the timing of the occurrence of an insult in utero and its correlation with the emergence of specific morbidity in the child. Dental abnormalities can pinpoint the stage of development at which a particular insult to the fetus occurred much as the widths of the rings of trees indicate the climate in particular years. Determining the time at which a damaging agent is present should greatly help to identify the agent, which is an important aim of the perinatal study.

2. A study is now being designed in cooperation with NICHD and five of the Collaborating Institutions to investigate chromosomal abberations at the final 7- and 8-year examinations.

3. A study is now under development at the Johns Hopkins University and the University of Buffalo to study their populations through age 12 to investigate learning disabilities.

4. A study is being jointly planned with NICHD to study the effect of the contraceptive pill on pregnancy outcome, using the 7-year-old study population.

5. In cooperation with the Office of Education and the Collaborating Institutions at Minnesota and Oregon, learning disabilities in the elementary school population are being investigated and correlated with antecedent information available in the project.

6. In cooperation with Tufts Medical School and MIT Computer Facility, studies on the effects of drugs taken during pregnancy on congenital malformations in the offspring, are currently undergoing intensive investigation.

7. The study of the unique population of 615 pairs of twins through age 15 or onset of puberty is being developed.

8. A scientist in Providence has established a neonatal behavioral scale working on the Providence sample of the study population. This behavioral scale, if validated on the population of the project as a whole, may serve as an additional source of identification of infants of high risk for neuropsychiatric damage.

9. Evaluation of the Socioeconomic Index used in the study as a predictive instrument of subsequent morbidity in the growing child is being developed.

10. The utility of the maternal blood samples is being studied to check into the possible correlation of maternal-nutritional inadequacy.

11. The utility of cord blood samples collected in the study is under investigation to document differences if any, in levels of various pollutants and their possible relationship with differences in child outcome or behavior.

12. A retrospective study, sponsored by the project in Metropolitan Washington, has revealed information on mental retardation which could be compared with information prospectively collected in the project. This is a special opportunity to compare two established longitudinal methods of investigations as to validity, efficiency, and reliability.

13. The mortality data available in the project are being compared with mortality data from the cities where the collaborating centers are located. This comparative study of mortality on these two sets of populations, by year, during 1959 through 1965, offers a singular opportunity to observe mortality in whites and Negroes, by specific birthweight-gestational age intervals.

The above samples demonstrate the wealth and potential of this study. We predict numerous additional leads and requests will present themselves when all the eleven task forces have completed their particular tasks.

This budget reduction comes at a time when serious thought is being given in the Project to a shift in emphasis from program maintenance to program development which calls for more money rather than less. This cut is imposed in the face of a rise in inflation and of an increase in salaries as well as in overhead and fringe benefits. The latter increases unfortunately create a situation which reduces the net budget directly available for the actual research operation.

In summary, we earnestly hope that these cuts, despite their anticipated and possible adverse impact on data collection, quality control, sample maintenance, and data analysis, will not jeopardize the initial national investment in the Project or its major goals. This hope is based on the confidence we have gathered over the years in these experienced investigators who have successfully managed in collaboration to weather previous cuts, and in their overall sense of commitment to serve the interests not only of the scientific community but also of the Nation as a whole.

POSSIBLE ACCOMPLISHMENT OF MAJOR OBJECTIVES

Senator COTTON. It has been hard for me, Mr. Chairman to understand why, with the increased cost of inflation, this particular program should get less. If you got just the same as you got last year, you would have less for your activities.

I do not quite understand why this particular program should be reduced.

Dr. MACNICHOL. I think the decision was made—it was not made at my level so I don't know all the answers—that the major objectives of the program could be carried out with less money. Admittedly, however, there are a lot of followup studies, leads that have been uncovered, special analyses done by the contractors themselves, which we have had to cut out. Also, there are certain things in quality control that we have had to reduce. Attempts to follow up the children are difficult because some have moved away. In other words, we won't be able to maintain quite as large a sample. But, in spite of this, I think we will be able to accomplish the major objectives that the study was set up to accomplish.

Senator COTTON. Dr. Janet Hardy of Johns Hopkins testified. Among other things, she said that the study data is supposed to be ready for tabulation and with this appropriation they couldn't tabulate it.

I am not asking you to comment on her testimony——

Dr. MACNICHOL. She knows this program as well as anybody.

Dr. MARSTON. Dr. Hardy has been over to talk with us about the problem.

Senator COTTON. It is not quite clear to me what this study was that she referred to.

Dr. MARSTON. This is a long-time epidemiological study which has included checking large numbers of serum from women during their pregnancy and then a followup of the children that are born, including periodic examinations of them at regular intervals. The hope is, that by an intensive study of the events just before and just after the birth of the child, we will have a better understanding of what might cause changes beneficially or not beneficially over time. It is a long-term study.

Senator COTTON. Was it contracted for by your institution?

Dr. MARSTON. Yes, sir. It is a major study that has been in existence now for—how many years?

Dr. MACNICHOL. Since 1959, for the main phase of the study.

Dr. MARSTON. It has about 3 or 4 more years to run, according to the initial protocol. Our decision, in relation to other priorities, was that we could lengthen out the period of the tabulation and analysis of the data and still eventually would get all the necessary information. It would take us a little longer to do it, rather than cutting other programs, which would mean that we would actually be cutting off actual research that was being done.

Senator COTTON. Your explanation of her testimony is that if you lengthen the study, the time does not yet come for the tabulation?

Dr. MARSTON. I think she is right on this. Again, I think we need to be sure what she meant. With these funds, one would not be able to do the tabulation as soon as one would do it if there were not this cut this year.

Dr. MACNICHOL. I am not sure, because a lot of the tabulation is being done and has been done for a long period of time. This is not being stopped. The analysis of the data on magnetic tape is being slowed down to some extent. Some of the data will not be collected.

As I say, I will be glad to submit a complete analysis of this so that you can examine it at your leisure, and also the study I promised you yesterday, Senator, the complete description of the program and what it has accomplished and what its aims are.

(The study follows:)

THE COLLABORATIVE PERINATAL STUDY—60,000 PREGNANCIES

CONTRIBUTIONS OF THE STUDY

It is estimated that 20 million Americans are afflicted with neurologic abnormalities, three-fourths of which had their origin in injury or disease occurring during the perinatal period (from conception to 28 days after birth). In addition, the U.S. ranks 13th in the world for deaths of the newborn, many of them due to severe forms of neurologic disorders.

One of the most important contributions made by the Study in the prevention of neurological damage has been its role in providing impetus to the campaign to develop a rubella vaccine. Fetal malformation was suspected to be related to infection of the mother with rubella in the first three months of pregnancy, but the Study showed that rubella threatens the fetus from two months prior to conception and during the second three months of pregnancy. This extension of the risk of the infection spurred on the campaign to wipe out rubella.

The Study has also shown, among other things, that certain viruses in the mother, once thought to be harmless, can lead to neurological damage in the newborn; that several drugs when taken during pregnancy can cause congenital malformations and stillbirth; that the maternal weight gain during pregnancy can have a significant effect on the birthweight of the infant and his development; that a lack of oxygen anytime during fetal development plays a major role in causing cerebral palsy; and that diabetes in pregnancy is related to the frequency of congenital malformations in the offspring.

THE SCOPE OF THE STUDY

Ground work for the Collaborative Perinatal Study was begun in 1952 when a planning group met to organize collaborating institutions (see p. 3939) with investigators from many disciplines under NINDS as a coordinating center and central laboratory.

The goal of the project was to monitor a group of women during their pregnancy, labor, and delivery and to relate various factors present to the outcome of the pregnancy and the future development of the children, especially concentrating on neurological damage.

In order to carry out this vast task, the planners decided that a study of very large dimension—60,000 pregnancies—was essential for statistical validity. The large number of mother-child pairs was necessary because of the relative infrequency of some of the neurological abnormalities and the complex nature of causal relationships.

After a pretest period of about 18 months, the Study was officially begun in January 1959 with the registration of the first pregnant woman. On each of the pregnant women to enter the program, information was gathered about past history, socio-economic background, obstetric course, and all medication, drugs, and vaccines given to the mother. Blood serum specimens were collected routinely to monitor possible occurrence of viral and other infection during pregnancy and events during labor and delivery were recorded.

Thus, throughout the time span of the Study, the lives of about 100,000 U.S. citizens (the mothers and their children, 45% white, 45% Negro, and 10% Puerto Ricans, American Indians, and Orientals) from many states have been under continuous investigation for over 10 years by hundreds of specialists in 36 professional disciplines working within 39 universities from 25 states. While there is a wide range of social background in the Study population, there is a concentration of women in the poorer, "high risk." levels of society, as might be expected of women seeking obstetric care in university medical centers.

The cost to the Federal budget during a decade of operation has been approximately $100 per year per person. The total therefore is $100 million. Through fiscal year 1974 approximately $20 million will be needed to successfully complete the planned data collection and to continue comprehensive anaylsis of the current phase.

After a seven-year period during which women entered the Study, the intake was terminated on December 31, 1965, when the goal of 60,000 pregnancies had been enrolled. The last delivery took place in September 1966, and the examination schedule of the children will be completed by September 1974 when the last child born in 1966 has an eight-year speech language and hearing examination.

The project children have been intensively studied in hospital nurseries, at four months (pediatric exam), eight months (developmental exam), twelve months (pediatric-neurologic exam), thirty-six months (language, hearing and speech), forty-eight months (psychometric), seven years (neurologic, psychologic, vision screening), and eight years (language, hearing and speech including evaluation of reading skills). Measurements of physical growth and medical history of illness and accident have been collected at each interval ((see p. 3933).

CURRENT STATUS OF THE STUDY

While the four-year examinations have been completed on all available children, about one-third of the seven year neurologic and psychologic test batteries, and one-third of the eight-year language, hearing and speech evaluations remain to be completed. These examinations are particularly important, because it is at these ages, when the children are in school, that the milder degrees of mental retardation can be recognized, and the presence of learning disabilities, particularly dyslexia, can be evaluated.

Data collection is nearing completion. The last children will reach eight years of age in late 1974. While the data base is not yet complete, analysis of the very large volume of data already in hand is well underway, under the direction of a number of small Task Force committees of specialists (see page 3934). Two review committees appointed by the Director, NIH, have examined the Study and found the data base not only adequate for the task but in many respects unique. The data bank is generally recognized to be unique in the world by those scientists familiar with its breadth and completeness.

DATA ANALYSIS

The huge reservoir of information collected contains statistical data on punch cards and magnetic tapes and includes, in addition, 300,000 blood specimens; and from autopsy material, 1,000 brain specimens, 400 infant specimens and 60,000 microscopic slides. Several hundred scientific articles have been published and a systematic and comprehensive analysis of the data is in process by 12 Task Forces.

The first major publication is a 500-page monograph called *The Collaborative Perinatal Study: The Women and their Pregnancies* which describes the women in the Study and the outcome of their pregnancies.

The second major publication, entitled *The Collaborative Perinatal Study: The First Year of Life* describes the infants, their nursery course, and outcome through one year. These unique pediatric data have been assembled, the analyses are complete, and the manuscript should be completed within the next three months.

While essentially descriptive, these two volumes point out many areas for further analysis, and some areas for public health action and program development.

Some 500 individual scientific papers have been published by staff members of the Collaborating Institutions and the NINDS staff (see page 3934), but major publications addressed to the basic goals of the Study have had to wait for completion of the data base.

PROMISING LEADS FOR THE FUTURE

The availability of this valuable data and the unique study population has opened up many opportunities for further investigation. An outline of anticipated studies follows:

(*a*) *"Repeat" pregnancies in the study.*—There are about 7,000 women who had two or more pregnancies while participating in the Study. These women and their babies offer a rich source of investigation because the woman now serves as her own control. That is, events surrounding the first pregnancy and birth can be compared with events surrounding the second pregnancy and its outcome and these can be later related to the children's development.

(*b*) *Opportunities for special studies.*—The following are a number of studies based on leads already evident from analyses of core data from the project.

1. The relationship between maternal weight gain during pregnancy and the weight of the baby is to be investigated by a primate nutrition study now under development jointly with the National Institute of Child Health and Human Development (NIHCD). This study in monkeys will provide an animal model for studying the effect of nutrition on birth, growth and development.

2. The relationship of spastic diplegia (weakness and stiffness of both legs) to short period of development within the uterus or to true prematurity, editorialized in the *Journal of Developmental Medicine and Child Neurology* (April 1970, Vol. 12, No. 2) is a new finding awaiting further exploration by additional studies on available brain specimens as well as by additional studies in neurochemistry.

3. The relationship of maternal factors, such as diabetes and acetonuria (an excess of acetone in the urine which occurs both in diabetes and indigestive dis-

orders) to intelligence is an exciting new lead warranting considerable exploration and expansion.

4. Controlled clinical trials of the relationship between infection in the newborn and mode of delivery are needed to ascertain whether or not Caesarean section would prevent, for example, an infection in the newborn due to a type of virus called herpes.

5. The relationship of maternal factors such as proteinuria (an excess of protein in the urine) to intelligence is an exciting new lead derived from the project. This study, which attempts to correlate blood chemistry with I.Q., awaits further analyses of blood sera collected from the mothers for amino acid determinations.

6. The relationship of estrogen therapy during pregnancy to the development of congenital heart disease, such as transposition of the heart vessels, in the child is of interest. In cooperation with the National Heart and Lung Institute (NHLI), the unique reservoir of information available in the project on congenital heart disease has revealed for the first time incidence figures on large samples of blacks and whites, as well as information on the natural history of congenital heart disease.

7. The relationship between maternal diabetes and congenital heart disease in the offspring is an exciting finding which points to a risk factor that warrants further exploration to guide preventive action.

8. An exploration of the possibility of identifying a third type of twinning, in addition to the fraternal twin and the identical twin, would be a fruitful area of research.

Scientists outside of the project, recognizing the value of data gathered and the unique study population available, have interest in the following investigations using project data:

(*a*) A study is being designed that will investigate differences among ethnic groups in the Study population, with intent to establish an ethnicity index based on blood type and other physical characteristics.

(*b*) A study is now being designed in cooperation with NICHD and five of the collaborating institutions to investigate chromosomal abberations at the final 7- and 8-year examinations.

(*c*) A study is now under development at The Johns Hopkins University and the University of Buffalo to follow-up the Study populations through age 12 to investigate learning disabilities.

(*d*) A study is being jointly planned with NICHD to investigate the effect of birth control pills on pregnancy outcome using the 7-year-old study population.

(*e*) In cooperation with the Office of Education and the Collaborating Institutions at Minnesota and Oregon, learning disabilities in the elementary school population are being investigated and correlated with antecedent information available in the project.

(*f*) In cooperation with Tufts Medical School and MIT Computer Facility, studies on the effects of drugs taken during pregnancy on congenital malformations in the offspring, are currently undergoing intensive investigation.

(*g*) A request by an eminent geneticist is currently being considered to collect dental cast impressions on the 7 year olds in the Study with a view to assess the timing of the occurrence of an insult while the child is in the uterus and its correlation with a specific disorder which may affect the child later.

(*h*) The study of the unique population of 615 pairs of twins through age 15 or onset of puberty has been proposed and would be expected to yield important information about maturation.

(*i*) The evaluation of a Socio-economic Index to be used to predict specific diseases which may affect a child in later life has been proposed. Such an index would relate socio-economic status with subsequent diseases and disorders.

(*j*) NICHD expects to explore the utility of maternal blood samples in checking the possible correlation of maternal-nutritional inadequacy based on the indirect parameters such as weight, height, weight gain in pregnancy, and possibly iron levels with various hormonal measures. They plan to use blood serum samples collected on the mothers in the Study population.

(*k*) Harvard and MIT investigators expect to study the utility of cord blood samples to document differences, if any, in levels of various pollutants and possible relationships with differences in child outcome or behavior.

The above examples demonstrate the wealth and potential of this Study. Numerous additional leads are anticipated when all the Task Forces have completed their data analysis.

(*c*) *Follow-up of special groups of children.*—The follow-up until adolescence or beyond of special groups of children identified in the Study could be of major importance. These groups are unique in the world in the wealth and detail of the prospective information available about them. Four of many possible examples are given below:

1. The twins—Some 620 pairs were born to Study mothers, approximately half to black mothers, providing an invaluable study population.
2. The children with congenital heart disease—Some 457 such children have already been identified and are being followed in collaboration with the National Heart and Lung Institute. This group offers a unique opportunity to study the causes and evolution of this important condition.
3. The children with minimal cerebral dysfunction (minimal brain dysfunction) and learning disabilities—The frequency in middle and upper class white patients of these disorders is estimated to be 5 to 10 percent. Incidence may be as high as 30 percent in "inner city" children, both black and white. An in-depth study permitting comparison of upper middle class children in the Buffalo sample with "inner city" black and white children in The Johns Hopkins sample would yield valuable information.
4. Children with seizures (epilepsy)—Numerous studies of great importance could be carried out on the children in the Study who have developed epilepsy.

COLLABORATING INSTITUTES

Some 14 medical institutions in different parts of the United States became participants in the Collaborative Perinatal Project; these included:

Boston Lying-In Hospital, Boston, Massachusetts.
Brown University, Providence, Rhode Island.
Charity Hospital of Louisiana, New Orleans, Louisiana.
Children's Hospital of Buffalo, Buffalo, New York.
Children's Hospital of Philadelphia, Philadelphia, Pennsylvania.
Children's Medical Center, Boston, Massachusetts.
Columbia University, New York, New York.
Johns Hopkins University, Baltimore, Maryland.
Medical College of Virginia, Richmond, Virginia.
New York Medical College, New York, New York.
Pennsylvania Hospital, Philadelphia, Pennsylvania.
University of Minnesota, Minneapolis, Minnesota.
University of Oregon, Portland, Oregon.
University of Tennessee, Memphis, Tennessee.

DATA GATHERED ON STUDY POPULATION

To accumulate the needed research information for the Study, pregnant women, as they registered for prenatal care in the collaborating hospitals, were selected at random to participate in the program. Information was recorded concerning their past medical history, family medical history, and factors concerning socio-economics. As the woman progressed through pregnancy, detailed records were kept of her condition at labor and delivery, and independent observers recorded detailed information regarding her progress, noting problems and difficulties. The newborns were closely observed in the first few minutes of life and were given pediatric and neurological examinations in the newborn period. Additional evaluation included a four-month pediatric examination, an eight-month examination of mental and motor development (Bayley Infant Scale), a one-year neurological examination, a three-year speech, language and hearing evaluation, a four-year psychological examinaton (Stanford-Binet Test, fine and gross motor evaluation, block sort test and behavioral profile), a seven-year neurological evaluation, seven-year psychological evaluation (Wisc, Bender Gestalt, Goodenough-Harris Draw-A-Person, Wrat, etc.), and an eight-year speech, language and hearing test.

Stillbirths and neonatal deaths at autopsy were examined uniformly. Blocks of certain tissues were sent to a central laboratory as were brain tissue specimens.

Serum samples were also collected during pregnancy and at birth to determine antibody response to infectious disease agents, primarily viruses, which infected the women and which might cause deficits in the offspring.

TASK FORCES FOR DATA ANALYSIS

Special ad hoc Task Forces of investigators from the Perinatal Research Branch, the Collaborating and other Institutions are now systematically pursuing the further analysis of data accumulated by this project in 10 significant major areas of concern. These are:

(1) *Labor and delivery.*—This group is analyzing the characteristics of labor and delivery and its complications in relationship to perinatal loss, child development, and neurological and intellectual deficits.

(2) *Infectious diseases.*—The main objective here is the investigation of the role infectious agents, particularly viruses occurring in pregnancy and during the perinatal period, play in fetal death and subsequent child development.

(3) *Genetics and congenital malformations.*—The focus of this Task Force is to investigate how genetic factors are related to human development and especially neurological and intellectual deficits. Further, this group is assimilating information regarding congenital malformation and its distribution in the population.

(4) *Drugs in pregnancy.*—This group studies the large number of drugs that are taken by women during pregnancy to explore whether these relate to any observed differences in fetal outcome including congenital malformations and subsequent child development.

(5) *One-year task force.*—The concern of this group is the analysis of prenatal and perinatal factors related to neurological abnormalities identified in one-year old children.

(6) *Four- and seven-year task force.*—Their objective is the analysis of pre- and perinatal factors related to neurological and intellectual deficits identified from four to seven years of age.

(7) *Three- and eight-year speech, language, and hearing task force.*—This group is concerned with analysis of pre- and perinatal factors related to speech, language and hearing performance as judged in three-year olds, and then again in eight-year old children.

(8) *Physical growth.*—This Task Force is concerned with the development of physical growth profiles based on physical measurements obtained on Collaborative Study children from birth on through age eight. Further, the group is looking at physical growth characteristics and many developmental characteristics in children as they differ by socio-economic background.

(9) *Toxemia.*—This Task Force is concerned with the evaluation of the utility of the clinical signs and symptoms which are part of the toxemia complex and its significance in perinatal mortality and prematurity.

(10) *Pathology task force.*—This Task Force is concerned with the analysis of the brain specimens from children dying during the perinatal period to get insight into the kind and frequency of apparent brain injury identified from postmortem examination.

PUBLISHED DATA ANALYSIS

The data analysis has, in general, taken three approaches. One approach is the comparison of outcome characteristics of children of women with specific complications to outcome characteristics of children from women without these complications using the total population. The second approach is the prospective matched-case approach, in which child characteristics of women with a specific complication, are compared to those of women without this complication, matching on variables such as institution of birth, race, socio-economic class, and certain other characteristics. Third is the retrospective approach, looking for differences in prenatal characteristics in children with a common deficit matched to a group of children without this deficit.

Obstetrical factors

Obstetrical factors which have been investigated in relation to neurological abnormalities observed during the first year of life, include maternal organic heart disease (Niswander et al., 1967; Niswander and Berendes, 1968), abruptio placentae (Niswander et al., 1966a), placenta previa (Niswander et al., 1966b), rupture of the marginal sinus (Niswander et al., 1968), prolapse of the umbilical cord (Niswander et al., 1966c, d), other umbilical cord complications (Spellacy et al., 1966), uterine dysfunction and dystocia (Vosburgh et al., 1966). Many of these conditions are associated with an increased perinatal mortality and prematurity rate and a lowering of Apgar scores (a numerical expression of the condition of a newborn) at 1- and 5-minutes. Only small differences were seen in neurological abnormalities at 1 year in these groups as compared to children from the remaining population whose mothers did not have these complications in pregnancy. Where a difference existed, pointing to an increase in neurological abnormalities at 1 year, it disappeared when birthweight was added as a control variable, suggesting that the increase in neurological abnormalities observed at least through 1 year of age is due to an increase in low birthweight children.

Fetal distress

Clinical fetal distress, defined as depression of the fetal heart below 100 beats per minute during labor, has also been explored as a factor in neurological and mental deficits. The analysis showed the expected strong association with neonatal mortality and depression of 1- and 5-minute Apgar scores consistent by birthweight (Benson et al., 1968). Children with low fetal heart rates during labor exhibited some delay in motor development, and a small increase in certain neurological abnormalities. Adjusting for ethnic and socio-economic effects, no difference in intelligence as measured at 4 years was seen between this children and the rest of the Study population (Berendes, 1968).

Late prenatal complications

In addition, comparisons were made between children of women with premature separation of the placenta, placenta previa, marginal sinus rupture, and prolapsed cord, and a group of children from women without these complications matched by institution of birth, race of mother, socio-economic class, sex of child, and birthweight of child. The observed difference in mean I.Q., which was not significant, was 3 points (Beredes, 1968).

Newborn characteristics

Several neonatal characteristics have been studied. These include birthweight and sex of the child, and Apgar ratings.

The known strong association between neurological disease, low Apgar score and birthweight was confirmed, the lowest birthweight group revealing the highest proportion of neurological abnormalities at 1 year (Drage, et al., 1966). A marked sex difference exists (Singer et al., 1968). Almost invariably, males show a higher proportion of abnormalities at 1 year, lower performance in mental and motor development at 8 months, or lower intelligence as measured at 4 years of age.

One- and 5-minute Apgar scores relate strongly to neonatal mortality (Drage et al., 1964). There is also an increase in neurological morbidity at 1 year for children with low 1- or 5-minute Apgar scores (Drage et al., 1966; Drage and Berendes, 1966). Better differentiation is seen using the 5-minute rather than 1-minute Apgar scores.

Recently, the relationship of Apgar scores to 4-year performance including I.Q. was explored. No consistent differences in intelligence scores were observed by Apgar scores when adjustments are made for ethnic, social and birthweight effects (Drage et al., 1969).

Cerebal palsy

A preliminary retrospective analysis was made of a group of children with cerebral palsy matched by institution of birth, race, maternal education, sex and birthweight to normal children. For these two groups the presence of clinical signs of fetal distress (fetal heart rate depression, meconium staining) and low 1- and 5-minute Apgars were tabulated. Eighteen of 61 children with cerebral palsy and 10 of 61 control children had one or more signs of distress. While the number of cases in specific diagnostic sub-groups was small, the observed difference appears to be due largely to an increase of distress in children with spastic diplegia and possibly complex diplegia (Berendes, 1968).

Maternal diabetes

Several prenatal characteristics have been studied in relation to intelligence of 4-year old children, utilizing the matched case approach. A significant lowering of intelligence was found among the offspring of diabetic women compared to matched controls (Churchill et al., 1969). Further analysis of these data revealed that this relationship only held for children of diabetic women who had experienced episodes of acidosis or acetonuria during pregnancy. This association was consistent whether diabetes was of long duration or only recently diagnosed. This led to the study of the relationship of I.Q. of children of non-diabetic women who had episodes of acetonuria in pregnancy. Such episodes of acetonuria are seen at times in women because of febrile illnesses associated with vomiting, possibly in a marginally nourished individual or in vomiting associated with hyperemesis gravidarum. Lowering of I.Q. was seen in children of women experiencing one or more episodes of acetonuria in pregnancy as compared to controls. These I.Q. differences were consistent by race. The I.Q. differences were greater when acetonuria was observed in the third trimester rather than the first or second trimester (Churchill and Berendes, 1969). This latter observation is to be taken with some reservations since the measurement of acetone excretion in urine was not routine in this program, thus raising the possibility of bias.

Pregnancy interval

Also of interest are the results of an investigation of the relationship of the pregnancy interval to intelligence in the offspring. This investigation was carried out by comparing children born within a year of the previous child to children born 3 to 5 years apart. Children from the short interval group had significantly lower intelligence at 4 years. Most of the I.Q. difference appeared to be due to the smaller size of the children of the short-interval group (Holley et al., 1969).

Congenital malformation

Differences in the frequency of certain congenital malformations have been observed between whites and blacks (Chung and Myrianthopoulos, 1968). Anencephaly is several times more frequent in whites, as is cleft lip with or without cleft palate. There is also an increase of syndactyly in whites. Polydactyly is observed many times more often in black babies. Common minor malformations among blacks are preauricular sinus, cleft gum and supernumerary nipples.

On initial analysis, the congenital malformation rate appears to be higher in black children than white children from the Collaborative Project. Among 19,961 white newborns the malformation rate was 2.7% and in 20,899 blacks 5.8%. This difference is accounted for almost entirely by the increased frequency of polydactyly, supernumerary nipples and small branchial clefts in black children. When these malformations are ignored, the malformation rate drops in whites to 2.5% and in blacks to 2.3%.

Not included in this tabulation was the presence of only one umbilical artery. In a preliminary analysis of a sample of cases, a single umbilical artery was found in .76% of all cases (Froehlich and Fujikura, 1966). In whites this malformation was seen in 1.2% of the cases and in 4% of blacks. Single umbilical artery was seen more frequently in children weighing 2,000 grams than in those weighting more than 2,000 grams. It is relevant to mention the increased frequency of single umbilical artery in children of diabetic mothers (Froehlich and Fujikura, 1966).

Problems ascertaining certain malformations at birth are well recognized. Congenital heart disease, for example, is reported with a frequency of 2.5 per thousand at birth. As the child grows older, the heart malformation may manifest symptoms or additional examinations allow its identification so that with longer follow-up the incidence of congenital heart disease in our population is 8.2 per thousand (Mitchell, 1971).

Of the prenatal factors examined, only the occurrence of diabetes in pregnancy seems to be related to the frequency of congenital malformations in the offspring. This difference is due primarily to an increase in congenital heart disease (Chung and Myrianthopoulos, 1968).

Comparisons have been made of the frequency of antibody titer changes to several viral antigens for children with congenital malformations of the central nervous system, drawn from stillbirths, neonatal and infant deaths, which had come to autopsy and matched controls. No significant differences were seen in antibody titer changes to 16 viral antigens between the subject and control groups (Elizan et al., 1969). The relatively small number of cases made it possible to analyze these data by specific malformation.

APPARENT ANTICIPATION OF DETRIMENT BY NONDEPARTMENTAL WITNESSES

Senator COTTON. My observation has been that many of these witnesses, especially the outside witnesses, who are very dedicated and very sincere, are a good deal like when you go to the dentist. It is not so much that he hurts you as it is that you think he is going to, you anticipate when he starts drilling on your tooth.

Apparently they anticipate detriment in some of these programs.

Dr. Marston. Dr. Hardy is a very fine person and we have great respect for her. There is no question that when you have a fund reduction in a project, this means you get less done than if you didn't have to absorb such reduction.

Dr. MacNichol. There is a specific cut in her program which I think bothers her a good deal. This is a study of perinatal infection for which she is doing her own data analysis. Because we do not have funds for them to do any data analysis themselves, it means that they are going to have to let one of their computer people go.

Senator Magnuson. She was not asking for much, but I think her fear was that she didn't want it slowed up. I said, "When will you conclude this?"

She said, "We are nearing the end," and that was her fear. It is a longtime study.

She said she thought it would end pretty soon. Then I suppose you start with a new study after that.

Dr. MacNichol. We have 3 years left to collect the data from the remaining 7- or 8-year-old children. Data analysis is getting up to a peak now and will extend over a 3- to 5-year period, depending on how many new questions come up that need to be answered, and the extent to which our funding requires a stretchout of the analysis.

SPINAL CORD RESEARCH CENTERS

Senator Magnuson. Senator Cotton, I guess, asked you about the spinal cord centers?

Senator Cotton. No. I didn't.

Senator Magnuson. How many do we have now?

Dr. MacNichol. Last year we funded two grants.

Senator Magnuson. I am talking about research centers.

Dr. MacNichol. Yes. These are research centers for spinal cord research. One at the Barrow Institute in Phoenix, Ariz., and one at Northwestern in Evanston, Ill.

Feasibility Studies for Comprehensive Spinal Cord Injury Research Centers

In addition, this year we have started a program of studies for feasibility of setting up comprehensive spinal cord injury research centers. We have asked for proposals. Quite a number of proposals have come in. This is a very gratifying response. These are being reviewed now. We plan to pick about six of them.

Senator Magnuson. Health service and health administration has the injury prevention. We hear a lot of testimony about lack of attention to this phase of injuries. But you people would be involved only in research?

Dr. MacNichol. Yes.

Senator Magnuson. If they set up a center for prevention or treatment of these things, you might be able to use that with some kind of grant for research, too?

Dr. MacNichol. It would be a good facility on which to build a research program.

Senator Magnuson. Everyone we listen to says there is a great lack of attention to this problem.

Acute Phase of Injury

Dr. MacNichol. The thing we are focusing on particularly is the acute phase. About 80 percent of the spinal cords which are injured and result in paraplegia are not actually broken. What happens is that they are injured to such an extent that there is a swelling and the swelling eventually kills the nerve fibers that pass through the affected area and they don't regrow. So, the problem is to control the swelling, prevent it from happening, and then function of the cord will be restored. This has to happen within a very few hours after the injury. This is why we are concentrating on the acute phase. As soon as the victim can be brought in, the most effective immediate treatment must be found.

Alleged Negligent Handling of Accident Victims Prior to Care of Competent Physician

Senator Cotton. Will you please excuse my interruption?

To me, the most distressing evidence we have heard in these hearings was the testimony of one doctor concerning the laxity of the ambulance and hospital emergency room attendants in their handling of victims of accidents. The damage which he stated the victims suffered from the negligence of these attendants between the time of the accident and the time they are eventually hospitalized under the care of a competent surgeon or doctor is absolutely shocking.

Have you people had any observations on that problem?

Dr. MacNichol. This is one of the things we are trying to do. We must find out what needs to be done early for these patients, how they need to be cared for before they get to the hospital, and what needs to be done for them in the beginning of their stay in the hospital, so that the damage doesn't become irreversible. Our long-range studies are in basic research into what promotes nerve regrowth. We hope that some day we can find out how to cause a very badly injured cord to repair itself.

Senator Cotton. I guess this is the fundamental duty of the Institutes of Health, but somebody in medical health should verify the situation. Here is Nader getting all kinds of devices in automobiles to lessen the impact and reduce the damages and we have all those types of things being done. I guess you know the witness better than I do—he sounds as though he knows what he was talking about; he was a physician surgeon. He looked into this.

The damage done between the accident and the emergency room was perfectly shocking. There is not much use spending a lot of money making automobiles safe and putting seat belts in and having elastic bumpers on them and all the rest and then have the patient really injured on the way to the hospital or in the receiving room.

Dr. MacNichol. Unfortunately, we are in no position to police what is being done. But we can find out what should be done and then make very strong recommendations.

Senator MAGNUSON. So that they know what to do.

Dr. MACNICHOL. Yes.

Senator MAGNUSON. At least, you have given them what your research finds out and it might simplify procedures; there are certain basic things that need to be done quickly.

Dr. MACNICHOL. Yes. When this is known, then the problem is to get it into the training of the various health professionals who are involved.

Senator MAGNUSON. Some wag said we ought to take them all to chiropractors right away; they would take care of it. You don't agree with that, do you?

Dr. MARSTON. No, sir.

GOVERNMENT EXPENDITURES ON AUTOMOBILE SAFETY: DEPARTMENT OF TRANSPORTATION AND HEALTH SERVICES AND MENTAL HEALTH ADMINISTRATION

Mr. MILLER. Senator, I would like to supply for the record, if we can, the funds that are spent in the Government for that problem that Senator Cotton described because I believe the Department of Transportation spends the bulk of the money on that.

Senator MAGNUSON. That is what I was going to ask next.

We spend some in health services and mental health administration.

Dr. MACNICHOL. Scientists in our accidental head injury intramural program collaborate closely with scientists at the Naval Medical Research Development Center. In turn, we are getting funds from the Department of Transportation to carry out some of this work so that there is a very good working liaison here. This program is primarily aimed at finding out what causes injuries so that the prevention people can do something about it.

IMPROVEMENT OF AMBULATORY SERVICES

Senator MAGNUSON. The Secretary in his original statement to us put strong emphasis upon the fact that the Department was going to try to beef up, as it were, all types of ambulatory services but the budget does not show that. We have an awful time, I know I had an awful time, trying to keep an ambulatory coronary care unit alive in my home town of Seattle which was costing about $300,000 a year. The city was putting up a little, the fire department ran the special vehicle and some doctors were all volunteering. They had an initial $50,000 grant and they cut it off on the theory that this was to be a pilot operation. When it served its purpose and it looked like it was worthwhile, then we get out, despite the Secretary's testimony in a general way.

This saved a lot of lives in stroke and coronary failures.

We finally got additional Federal funds to carry on. It was like pulling teeth out of a hen to get that amount for the Federal contribution.

Mr. MILLER. Mr. Chairman, I think the Secretary was using ambulatory in a different sense than you are.

Senator MAGNUSON. This should be part of our responsibility if we are going to get into what you are talking about.

Senator COTTON. Do you mean that, when the chairman said "ambulatory," he meant getting them on their feet?

Mr. MILLER. He meant places where people needed medical care but did not need inpatient service.

You are correct about the cut, I am sure. I am sure the Secretary——

Senator MAGNUSON. I didn't mean just getting them back on their feet but saving lives in the first place. That is a broad program. This saves a lot of lives in stroke because now you folks know they have a system where they talk to the hospital they are going to on the way there to get the things ready that Senator Cotton is talking about, what kind it is and what to do.

PHYSICIANS IN AMBULANCE CREWS

Senator COTTON. You are a bunch of doctors; even though this is not your particular responsibility, isn't it a fact that an intern, some doctor accompanies every ambulance on an emergency case?

Dr. MARSTON. No, sir. That has not been the pattern for a number of years.

Senator COTTON. That is only in the movies like Dr. Ben Casey?

Dr. MARSTON. No, sir. I don't think that occurs anywhere, so far as I know. In fact, I suspect I was one of those of this generation who were probably among the last to ride the ambulance as a routine fashion.

Senator COTTON. It is not done any more?

Dr. MARSTON. No, sir.

Senator COTTON. They just don't have the manpower to do it?

Dr. MARSTON. There is the question of manpower as well as the question of what one can do in severe injuries at a distance. Generally, it is better to have your skilled manpower and the equipment in the emergency room.

As you are pointing out, this is a very complicated problem. Part of the problem has been that the emergency rooms have been overrun by people with no emergencies. This has meant that it has been more difficult for the emergency room personnel to treat the emergencies, because people have gone there just to see a doctor rather than from an emergency standpoint.

Dr. MACNICHOL. The trouble is that there are not separate emergency rooms in outpatient clinics in some hospitals.

Senator MAGNUSON. In Seattle, the fire department has a list every day of the doctors who have volunteered to do a tour of duty on a given 8-hour period whom they can call and he will get to the hospital or the emergency room while the ambulance is bringing them in They volunteer their services. It is a sort of round-the-clock thing There are always five or six or 10 who say, all right, we will be available from midnight to eight o'clock; something like that. Now, that is a good service.

Senator COTTON. Off the record.

(Discussion off the record.)

TRAINING OF AMBULANCE PERSONNEL

Dr. MARSTON. Since the days doctors stopped riding ambulances, it has been very important to have the people who ride ambulances receive adequate training. NIH is involved in pilot studies on how best to train emergency personnel.

We have, in the Bureau of Health Manpower Education under Dr. Endicott, supported the development of better trained people to come to grips with the type of questions you have raised here—adequate training for ambulance personnel who go out and make the first contact with injured people.

Senator MAGNUSON. Well, RMP could get into training of, say, firemen, policemen, and things like that.

Mr. MILLER. RMP has supported coronary care units. The Seattle mobile coronary care unit was funded through the RMP.

Senator MAGNUSON. But RMP could get into that.

Mr. MILLER. I am uncertain about the training aspects of this.

Dr. Marston knows more about this than I do.

Senator MAGNUSON. The firemen, if they are in a large city, get that kind of training. You get in the rural centers and small towns where they have volunteer fire departments, things like that, they just don't know, and they don't have access to this type of training.

Dr. MACNICHOL. One of the things we want to do in these spinal cord injury centers is to find out what the ambulance people need to be taught.

Senator COTTON. This note says that recently in the District of Columbia the hospital ambulance services have recently been discontinued and the fire department now supplies the public ambulances.

SUMMARY OF DEPARTMENT JOINT EFFORTS WITH OTHER DEPARTMENTS

Dr. MARSTON. In view of the importance of this subject and the interest of the committee, I would think, Mr. Miller, that we should be able to get together a summary of what the Department is doing and its relationship with other departments for insertion in the record at this point.

Senator COTTON. I certainly would appreciate that.

Senator MAGNUSON. I would, too, because this can do a lot of things. There seems to be a gap there. Once they get in the hospital and the doctor shows up and they are in bed, that is one thing. But, before that there is a big gap.

(The summary follows:)

FEDERAL GOVERNMENT PROGRAMS IN EMERGENCY MEDICAL SERVICES

Programs concerning emergency medical services are carried on by three departments of the Federal Government: Health, Education, and Welfare. Transportation, and Defense. Activities of these departments are described below.

HEALTH, EDUCATION, AND WELFARE

Health Services and Mental Health Administration, Division of Emergency Health Services

Day-to-day sudden illness and injury has been called the "neglected disease of modern society." An estimated 60,000 premature deaths and untold disabilities occur each year due to inadequate rescue and first aid efforts and poor care in ambulances and hospital emergency departments. The Division of Emergency Health Services of the Health Services and Mental Health Administration provides consultation, current emergency medical care literature. and a small amount of seed money to States and communities to stimulate analysis and improvement of existing emergency medical care systems. The emergency medical care component of the Division produces guidance materials for States and local communities, hospitals, education institutions, and health planning groups.

Current activities relating to sudden illness and injury include:

1. *Upgrading of Ambulance Services.* By providing information and recommendations, review and guidance for State and local legislative drafts controlling quality of services, and by having input into the review process of various Federal programs, i.e., the National Highway Safety Bureau of the Department of Transportation, the Division of Emergency Health Services actively promotes the use of adequately designed, equipped, and staffed ambulances with central dispatch and total communications capability.

2. *Improvement of Hospital Emergency Facilities.* To sustain the continuum of care initiated on the ambulance, emergency departments must be upgraded. The Division works with appropriate national, State, and local groups to promote regionalization of hospital emergency care through a categorization process. Also stressed is in-service and formal training, institution of radio communications between emergency rooms and ambulances, and mutual cooperative relationships between hospitals and ambulance services.

In addition to the promotion inherent in developing emergency medical service systems, this activity is also emphasizing the need for planning for provision of alternatives for non-emergency patients who now overburden emergency departments because of the inaccessibility of other services and the need for broadening the role of ambulance services to provide coronary care capability through additional training and the use of telemetry, defibrillation, and intubation procedures.

Regional Medical Programs Service

Through the efforts of 19 regions over 25,000 emergency health personnel (firemen, ambulance drivers, policemen, etc.) have received training. These programs included both the teaching of new skills and the upgrading of existing skills, as well as training new people in the allied and other health areas.

National Center for Health Services Research and Development

The Center has sponsored the following projects concerned with emergency medical services:

Grants:

Emergency Care Research Institute, Philadelphia, Pennsylvania. "Development of Emergency Life Support Pod."

Emergency Care Research Institute, Philadelphia, Pennsylvania. "Demonstration of Hospital Emergency Command System."

University of Southern California, Los Angeles, California. "Development of Automated System for Critical Care Units."

University of Rochester, Rochester, New York. "Development of Emergency Care through Videotape Recording."

Contracts:

University of Southern California, Los Angeles, California. "Development of an Emergency Room Medical Team."

National Institutes of Health

The *Bureau of Health Manpower Education* of the NIH has a contract with the South Carolina Hospital Association, West Columbia, S.C., for: "Planning for Training of Emergency Personnel in South Carolina."

DEPARTMENT OF TRANSPORTATION

The Highway Safety Act of 1966 requires that States have a highway safety program developed in accordance with uniform standards promulgated by the Secretary of Transportation. The purpose of the standard which has been developed for emergency medical services is to provide an emergency care system which will provide quick identification and response to accidents; sustain and prolong life through proper first aid measures, both at the scene and in transit; and provide the coordination, transportation, and communications necessary to bring the injured and definitive medical care together in the shortest practicable time, without simultaneously creating additional hazards.

The standard provides that each State, in cooperation with its local political subdivisions, shall have a program to ensure that persons involved in highway accidents receive prompt emergency medical care under the range of emergency conditions encountered. The programs are to provide, as a minimum: (1) training, licensing, and related requirements for ambulance and rescue vehicle operators, attendants, drivers, and dispatchers; (2) requirements for types and numbers of emergency vehicles including supplies and equipment to be carried; (3) requirements for the operation and coordination of ambulances and other emergency care systems; (4) first aid training programs and refresher courses for emergency service personnel, and encouragement of the general public to take first aid courses; (5) criteria for use of two-way communications; (6) procedures for summoning and dispatching aid; (7) an up-to-date, comprehensive plan for emergency medical services, including facilities and equipment, definition of areas of responsibility, agreements for mutual support, and communications systems; and (8) periodic evaluation by the State and submission of an evaluation summary to the National Highway Safety Bureau.

Section 402 of the Highway Safety Act provides funding assistance to the States for the conduct of their highway safety programs. The funds may be used for political subdivision emergency medical services projects within the framework of an overall state highway safety program.

DEPARTMENT OF DEFENSE

The Military Assistance to Safety and Traffic (MAST) program is a project to test the feasibility of utilizing military helicopters and medical corpsmen as an adjunct to the local Emergency Medical Service system for the purpose of providing assistance to civilian victims of traffic accidents and other medical emergencies. Patients are transported from the scene of the emergency to the appropriate medical facility, critical patients are transferred between hospitals, and medical specialists and equipment are transported to the emergency scene.

Existing personnel and equipment from military units normally assigned to the test areas work in cooperation with local health care providers and law enforcement officials according to a locally developed plan between the civilian and military communities. Tests are being conducted in the following areas: San Antonio, Texas; Colorado Springs, Colorado; West-Central Washington (Seattle); Phoenix, Arizona; and Mountain Home, Idaho. As of July 25, 1971, 583 patients had been transported in 470 missions.

STEADY PROGRESS

Senator MAGNUSON. All right.

You have some conclusions you wanted to give.

Dr. MACNICHOL. To sum up, I feel we are making steady though not spectacular progress. Many new leads are appearing and they are being followed up as fast as our resources permit.

I think I have already mentioned that our budget request is $96,521,000, which is $2,961,000 less than our adjusted apportionment in 1971.

Senator MAGNUSON. I have no further questions.

Thank you, Doctor. We appreciate your testimony.

Senator COTTON. Thank you, Doctor.

Dr. MACNICHOL. Thank you, sir.

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

For expenses, not otherwise provided for, necessary to carry out title IV, part D of the Public Health Service Act with respect to allergy and infectious diseases, [$102,249,000] *$99,342,000.*

Amounts Available for Obligation

	1971 Estimate	1972 Estimate
Appropriation	$102,249,000	$99,342,000
Real transfer to:		
"Departmental Management"	-31,000	---
Real transfer from:		
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs.)	119,000	---

Comparative transfers to:

"Office of the Director"	-746,000	---
"National Heart and Lung Institute"	-802,000	---
"National Institute of Arthritis and Metabolic Diseases"	-1,023,000	---
"Health Manpower"	-1,642,000	---
Total, obligations	98,124,000	99,342,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
13	Research	---	$56,052,000	---	$56,919,000	---	+$867,000
	General research support grants	---	(5,044,000)	---	(4,494,000)	---	(-550,000)
	Categorical clinical research centers	---	(1,266,000)	---	(1,266,000)	---	(---)
	International centers for medical research and training	---	(2,263,000)	---	(2,263,000)	---	(---)
	Scientific evaluation	---	(40,000)	---	(40,000)	---	(---)
21	Fellowships	---	3,579,000	---	3,334,000	---	-245,000
23	Training	---	7,280,000	---	7,280,000	---	---
	Direct operations:						
24	Laboratory and clinical research	576	17,329,000	576	17,745,000	---	+416,000
28	Collaborative research and development	36	11,661,000	36	11,729,000	---	+68,000
34	Review and approval of grants	43	1,627,000	43	1,714,000	---	+87,000
34	Program direction	32	596,000	32	621,000	---	+25,000
	Total obligations	687	98,124,000	687	99,342,000	---	+1,218,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions........................	687	687	---
Full-time equivalent of other positions..................	18	18	---
Average number of all employees.......................	705	705	---
Personnel compensation:			
Permanent positions..............	$8,488,000	$8,974,000	+$486,000
Positions other than permanent...	136,000	180,000	+44,000
Other personnel compensation.....	150,000	150,000	---
Total personnel compensation...	8,774,000	9,304,000	+530,000
Personnel benefits.................	876,000	919,000	+43,000
Travel and transportation of persons...........................	350,000	350,000	---
Transportation of things...........	85,000	85,000	---
Rent, communications, and utilities........................	270,000	278,000	+8,000
Printing and reproduction..........	60,000	60,000	---
Other services.....................	1,248,000	1,253,000	+5,000
Project contracts................	10,567,000	10,372,000	-195,000
NIH Management fund.............	6,283,000	6,452,000	+169,000
Supplies and materials............	2,300,000	2,336,000	+36,000
Equipment.........................	400,000	400,000	---
Grants, subsidies, and contributions...................	66,911,000	67,533,000	+622,000
Total obligations by object.........................	98,124,000	99,342,000	+1,218,000

Summary of Changes

1971 estimated obligations	$98,124,000
1972 estimated obligations	99,342,000
Net change	+1,218,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs...	---	---	---	+$368,000
2. One additional day of pay	---	---	---	+33,000
3. Within grade pay increases	---	---	---	+150,000
4. FTS rate increase	---	---	---	+8,000
5. Wage board pay raise...	---	---	---	+23,000
6. Non-competing research grants	---	---	---	+2,901,000
B. Payments to the "National Institutes of Health management fund" for centrally furnished services	---	$6,283,000	---	+169,000
Total, increases	---	---	---	+3,652,000
Decreases:				
A. Program:				
1. Research grants	---	56,052,000	---	-2,034,000
2. Fellowships	---	3,579,000	---	-245,000
3. Laboratory and clinical research	576	12,039,000	---	-155,000
Total, decreases...	---	---	---	-2,434,000
Total, net change	xxx	xxx	xxx	+1,218,000

Explanation of Changes

Built-in Increases--These increases will provide $368,000 for annualization of 1971 pay increase costs; $33,000 for one additional day of pay in 1972; $150,000 for within grade pay increases in 1972; $23,000 for wage board pay increases; $8,000 for increased costs in 1972 for use of the Federal Telecommunications System and $2,901,000 for 46 additional non-competing research grants.

Program decreases:

Research grants -- The decrease of $2,034,000 reflects a decrease of $1,484,000 in low priority regular research grants, and will provide a net total of $48,856,000 to fund 1,239 awards in 1972. The request also includes a decrease of $550,000 for general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships -- The decrease of $245,000 will provide a total of $3,334,000 and approximately 186 awards, or 17 below the 1971 level.

Laboratory and clinical research -- The decrease of $155,000 will provide a total of $11,874,000 and 576 positions for intramural research, and is a reduction in contractual support of this research.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action taken or to be taken
1971 Senate Report	
Special grants	
1. The Committee believes that the launching of these units (clinical allergy research centers) is a necessary next step in translating the results of research at the laboratory bench into practical application by physicians treating allergic patients, and must not be delayed. (Page 42)	1. The Institute has established a special grant program for the support of allergic disease centers. Eighteen applications will be reviewed by the March Council for possible payment. The expected funding of this program is about $450,000.
2. As in many other areas, the Committee does not feel that enough is being done to develop new training programs for physicians assistants especially trained in allergy treatment. The Committee will expect future budgets to reflect attention to these needs. (Page 42)	2. It is expected that establishment of allergic disease centers in various parts of the United States will provide the opportunity for improved training of all levels of medical care and research for the prevention and treatment of allergic disorders. The present budget provides the same level of effort for the allergic disease centers as that of 1971.

Authorization Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act of 1944:		
Section 301 -- Research and Investigation, in general.......	Indefinite	$99,342,000
Title IV, Part D -- National Institute of Allergy and Infectious Diseases............	Indefinite	99,342,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in section 301 of the Public Health Service Act.

The Public Health Service Act, Title IV, Research Institutes, Part D, National Institute on Arthritis, Rheumatism, and Metabolic Diseases, National Institute of Neurological Diseases and Blindness, and other Institutes.--

"Sec. 431 (b) The Surgeon General is authorized with the approval of the Secretary to establish in the Public Health Service one or more additional institutes to conduct and support scientific research and professional training relating to the cause, prevention, and methods of diagnosis and treatment of other particular diseases or groups of diseases (including poliomyelitis and leprosy) whenever the Surgeon General determines that such action is necessary to effectuate fully the purposes of section 301 with respect to such disease or diseases."

"Sec. 433 (a) Where an institute has been established under this part, the Surgeon General shall carry out the purposes of section 301 with respect to the conduct and support of research relating to the disease or diseases to which the activities of the institute are directed, through such institute and in cooperation with the national advisory council established or expanded by reason of the establishment of such institute. In addition, the Surgeon General is authorized to provide training and instruction and establish and maintain traineeships and fellowships, in such institute and elsewhere, in matters relating to the diagnosis, prevention, and treatment of such disease or diseases with such stipends and allowances (including travel and subsistence expenses) for trainees and fellows as he may deem necessary, and in addition, provide for such training, instruction, and traineeships and for such fellowships through grants to public and other nonprofit institutions. The provisions of the subsection shall also be applicable to any institute established by any other provision of this Act to the extent that such institute does not already have the authority conferred by this subsection."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental Management	-$31,000	For consolidating within the Office of the Secretary, DHEW, certain construction activities through the establishment of the Facilities Engineering and Construction Agency.
Real transfer from:		
National Institute of General Medical Sciences	119,000	Proposed transfer for increased pay costs which could not be absorbed by the receiving appropriation.
Comparative transfers to:		
Office of the Director	-76,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
Office of the Director	-670,000	To provide an equitable distribution of the Management Fund in 1972.
National Heart and Lung Institute	-802,000	Transfer of regular research grants for the pulmonary research program.
National Institute of Arthritis and Metabolic Diseases	-1,023,000	Transfer of regular research grants for the malnutrition research program.
Health Manpower	-1,642,000	Transfer of institutional support to Health Manpower.

National Institute of Allergy and Infectious Diseases

Year	Budget Estimate To Congress	House Allowance	Senate Allowance	Appropriation
1962	$48,322,000	$52,182,000	$60,000,000	$56,091,000
1963	59,342,000	62,142,000	68,142,000	66,142,000
1964	69,226,000	68,723,000	69,226,000	68,723,000
1965	68,600,000	70,100,000	70,400,000	70,100,000
1966	74,987,000	74,987,000	77,987,000	77,987,000
1967	85,702,000	88,670,000	90,670,000	90,670,000
1968	94,422,000	94,422,000	98,922,000	94,422,000
1969	98,562,000	95,119,000	99,119,000	96,840,500
1970	102,389,000	102,389,000	105,000,000	103,694,500
1971	99,219,000	102,249,000	102,749,000	102,249,000
1972	99,342,000			

National Institute of Allergy and Infectious Diseases

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	687	$9,650,000	687	$10,223,000	---	+$573,000
Other expenses.........	---	88,474,000	---	89,119,000	---	+645,000
Total............	687	98,124,000	687	99,342,000	---	+1,218,000

General Statement

The Institute conducts and supports broadly based research on the causes, characteristics, prevention, control, and treatment of diseases believed to be caused by infectious agents including bacteria, fungi, viruses, and parasites--or by abnormalities in the body's immune mechanisms such as allergies. In its attack on infectious and allergic diseases, the Institute is focusing attention primarily on important problems that demand increased research efforts. Two types of programs - nationally organized research programs and special emphasis research programs have been set up to deal with these problems.

The nationally organized research programs are collaborative, contract-financed, institute-coordinated efforts carried on by many laboratories to attain a common goal. They are conducted in partnership with industry, university research centers, and other institutes of NIH. The special emphasis research programs are designed to intensify investigations of critical disease problems in urgent need of increased effort. Special emphasis research programs are also aimed at promoting the exchange of information to help identify and evaluate avenues of research that should be followed. The Institute also supports a large body of free-ranging investigator-inspired research.

The National Institute of Allergy and Infectious Diseases is requesting a total of $99,342,000 for 1972, a net increase of $1,218,000 above the 1971 level. This net increase is to be directed toward the following areas: (1) research grants +$867,000; fellowships -$245,000; and (2) laboratory and clinical research +$416,000; collaborative research and development +$68,000; review and approval of grants +$87,000 and program direction +$25,000.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research projects.............	$47,439,000	$48,856,000	+$1,417,000
Special programs..............	8,613,000	8,063,000	-550,000
Total research grants.....	56,052,000	56,919,000	+867,000

Introduction:

The Extramural Programs of the National Institute of Allergy and Infectious Diseases provide research grant support to investigator initiated research projects in public or other nonprofit institutions as part of a coordinated attack on allergic, immunological, and infectious diseases of man. These programs seek to establish, expand, and improve research and training activities in disease problems of national importance. A number of urgent disease problems have been identified for special support. The Institute and its advisors selected these special programs not only because of the importance of the disease problem, but also because of recently identified research opportunities in these fields.

Allergy and Other Immunologic Disorders:

Transplantation Immunology

This special emphasis area is concerned principally with identification of the mechanisms of cellular immunity, without which the full potential of clinical transplantation cannot be realized. The basic components of this area are the isolation and characterization of the cell membrance histocompatibility antigens that determine the career and fate of lymphocytes; knowledge of the regulatory mechanisms that determine the transformation, by specific antigens, of quiescent small lymphocytes into new biosynthetic activities; and identification of the mediators of cellular immunity systhesized by immune lymphocytes following contact with antigen.

Impressive progress is being made in these three segments of this field, the majority of developments being promptly applicable to urgent clinical problems. This area is unique in the convergence of basic research and the solution of practical medical problems relative to autoimmune disease states, tumor immunity, homograft rejection, immunity to intracellular parasitism with bacteria, viruses and fungi.

This program area will be funded at a level of approximately $3,386,000 in 1971, and $3,429,000 in 1972, an increase of $43,000.

Allergic and Immunologic Diseases

This special emphasis area is concerned with primary immunological deficiency diseases that are genetically controlled abnormalities in the maturation of the immune system, and secondary immunological deficiencies resulting from naturally occurring diseases involving a mature immunological system. Failure of immune competence can involve antibody deficiency syndromes or defects in the thymus-dependent cellular system. Loss of natural tolerance can occur and be expressed as autoimmune responses. Tissue injury with major consequences can develop following in vivo antigen-antibody reactions; i.e., immune complex disease.

There is continuing recognition of diseases with immunologic concomitants and the establishment of immunologic etiology for heretofore obscure disease states - particularly the immunologic consequences of chronic viral infection. It is now clear that immunologic diseases constitute a major segment of modern medicine.

This program area will be funded at a level of approximately $9,156,000 in 1971, and $9,274,000 in 1972, an increase of $118,000.

Viral Diseases and Problem Areas:

Interferon and Other Antiviral Substances

Diseases of viral origin constitute the largest single cause of morbidity in this country. In addition, there is accumulating evidence that many diseases of unknown etiology eventually may be shown to be of viral origin.

The great diversity of virus types necessitates the employment of broadly based alternative approaches in combating virus diseases. Drug screening, largely empirical, has revealed no drugs (with a few isolated exceptions) useful in combating viral diseases.

Interferon is an antiviral substance elaborated by the host cell in response to viral attack. It can also be induced by non-pathogenic agents or chemicals which stimulate the cell to manufacture this substance. We have current interest in the class of such compounds known as synthetic RNAs which induce interferon production in the cell. The use of these compounds represents one of the most interesting current advances in the search for antiviral substances. If certain problems of compound toxicity can be overcome, these substances may ultimately play a role in preventing and perhaps even treating viral infections in man. The induction of interferon through the use of these compounds is an illustration of how an understanding of the basic molecular biology of nucleic acids can contribute a practical method of coping with viral infections through disruption of the growth of the virus.

In the past the role of basic research in the development of antiviral substances has been limited, due largely to the lack of detailed information concerning viral protein structure and viral nucleic acid structure. This in turn has precluded the development of precisely defined modes of attack on the problem of selective inhibition of viral synthesis or function.

More recently, the increasing knowledge of the structure and metabolism of nucleic acid and protein syntheses has provided a large resource base of interest and an opportunity for new studies on antiviral activity through molecular biology. Additional information is needed concerning virus-specific features of viral macromolecules.

This program area will be funded at a level of approximately $4,949,000 in 1971 and $5,012,000 in 1972, an increase of $63,000.

Chronic and Degenerative Diseases

These diseases, because of their slow development and protracted course, are recognized as significant public health problems. Such problems as chronic renal diseases, degenerative diseases of the central nervous system (CNS), chronic vascular disease and connective tissue disorders all are part of this Special Emphasis area. Newer knowledge in this area tends to substantiate the role of infectious agents and immunologic aberrations as being of prime importance in their causation. Of basic importance in developing knowledge of these diseases are a number of natural and experimental animal diseases which, although not substituting for direct human studies, parallel the chronic and degenerative diseases of man. Scrapie, a degenerative CNS disease of sheep caused by a "slow" virus infection, has a direct bearing on demyelinating diseases of man such as multiple sclerosis. Equine infectious anemia, equine viral arteritis, and encephalomyocarditis of mice are research areas also being funded as model systems with great potential for understanding similar human diseases. Rapid progress in research on chronic and degenerative disease has been hampered by the inability to establish some of the infectious agents in tissue culture systems and in suitable animal models. It is gratifying to note a considerably increased interest and activity in this admittedly difficult research area. This Institute will continue in its efforts to stimulate further research and interest in chronic and degenerative diseases.

This program area will be funded at a level of approximately $1,563,000 in 1971, and $1,583,000 in 1972, an increase of $20,000.

Infectious Hepatitis

Infectious hepatitis is a disease of major public health importance, with approximately 45,000 cases being detected and 900 deaths occurring each year in the United States. Although this disease has been the target of intensive research by many capable investigators, only limited success has been achieved thus far; much more remains to be done in the study of this difficult disease entity. One new and very promising area in the field of hepatitis research is the recent discovery of the so-called Australia antigen, or the "hepatitis-associated antigen." Many research workers now believe that this virus-like agent, found in the serum of hepatitis patients, may be the actual causative agent, or an infectious entity closely related to it. As a result of this recent work, renewed interest in this area of research has been stimulated.

More sensitive and rapid methods for detection of the Australia antigen are being developed. It is hoped that these tests will be useful for detection of "carriers" of the agent in blood bank operations, thereby eliminating one major source of the disease. New research grant applications in this area are continuing to come to this Institute for funding as evidence of a renewed interest in hepatitis. It is the desire of this Institute to continue to stimulate and support such projects to the greatest extent possible.

This program area will be funded at a level of approximately $97,000 in 1971, and $101,000 in 1972, an increase of $4,000.

Parasitic Diseases and Problem Areas

Research on diseases caused by animal parasites seek new means of treatment or control of parasitic infections. Animals serving as models produce information which is applied to research on such important human diseases as malaria, amebiasis and schistosomiasis.

Immunity to Animal Parasites

This special emphasis area encourages research leading to vaccination against many diseases which are caused by animal parasites. Present methods of treatment for these diseases are not satisfactory and many obstacles prevent development of drugs for large scale parasite control. It is therefore important that new means of immunization against parasites be investigated.

This program area will be funded at a level of approximately $1,503,000 in 1971, and $1,515,000 in 1972, an increase of $12,000.

Transmitters of Disease

Many human diseases, especially those caused by animal parasites or by viruses, are transmitted by insects, mites and ticks, or by snails. Research activity in this area seeks to control certain diseases by interrupting the transmission.

This program area will be funded at a level of approximately $1,700,000 in 1971, and $1,715,000 in 1972, an increase of $15,000.

Biological Regulation of Vectors

Recent publicity on dangers of using DDT and certain other insecticides emphasizes the need for research on control of such disease vectors as insects and snails. This area has been designated as one for special emphasis to encourage research on chemicals determining vector behavior, hormones affecting vector development, and genetic regulation of vectors.

This program area will be funded at a level of approximately $1,510,000 in 1971, and $1,524,000 in 1972, an increase of $14,000.

Bacterial and Mycotic Diseases

Streptococcal Diseases and Sequelae--Studies on the relationship of the biological and epidemiological characteristics of group A streptococci to their role in the pathogenesis of acute rheumatic fever, rheumatic heart disease and acute glomerulonephritis should be intensified. Many gaps remain in our knowledge of the various components and products of these organisms. The mechanisms by which these infections result in serious non-suppurative complications are not clear. Consequently, ways to improve control of the diseases remain uncertain.

Accumulating epidemiological and immunologic evidence suggests that certain strains are nephritogenic while others are rheumatogenic. Perhaps there are strains which have the potential to be involved in both of these sequelae and some that cause neither. Clarification and extension of our fundamental knowledge of streptococcal infections is highly important.

This program area will be funded at a level of approximately $984,000 in 1971 and $1,013,000 in 1972, an increase of $29,000.

Drug Resistance--Bacterial and fungal infections, once considered a minor problem on the verge of extinction as a result of the new antibiotics, have become extremely troublesome, and in many situations life-threatening. Many of these very serious infections arise in patients undergoing immunosuppressive therapy or suffering from naturally altered immune responses.

Hospital acquired infections are now a worldwide problem, with an increasing annual frequency. In large city hospitals, for example, 15% of infections are hospital-acquired, either through the airborne route or through medically necessary manipulative procedures. The financial and medical resources thus wasted are cause for concern. The pathogenic organisms involved are primarily common opportunistic pathogens, normally of little significance except to the seriously ill or to the immunologically compromised patient. It can be expected that staphylococcal strains and fungal organisms in hospitals, resistant to the newer drugs, will emerge; therapy for these common hospital-acquired infections will therefore become more difficult.

Continuing research to combat these drug-resistant microorganisms and to understand the nature of hospital-acquired infections will continue to be one of the Institute's major goals.

This program area will be funded at a level of approximately $6,396,000 in 1971, and $6,478,000 in 1972, an increase of $82,000.

Special Programs

General Research Support Grants--A level of support of $4,494,000 is proposed for 1972, a reduction of $550,000 from the 1971 level of $5,044,000.

These funds represent the Institute's proportionate share of the proposed budget for this program.

Categorical Clinical Research Centers--$1,266,000--The same level of support, $816,000 is continued from 1971 to 1972 for centers participating in multidisciplinary investigations brought to bear on disease areas of critical need, including transplantation immunology and allergies.

During the 1971 hearings before the Committee on Appropriations the need for Allergic Disease Centers was explained and justified. At the strong recommendation of the Committee the Institute has established an Allergic Disease Centers program.

Asthma and other allergic disorders affect at least 31 million Americans - asthma alone causes 4,000 deaths a year and disables many thousands more. Significant advances in new knowledge of the immunological events related to these disorders have been made in recent years. The time is opportune to extend this capability to improved prevention, diagnoses and treatment. Accordingly the Institute is broadening its clinical allergy program in 1971 by the establishment of a small number of Allergic Disease Centers which purposely combine high scientific competence in immunology and experienced clinical expertise to develop better methods of management of allergic disorders. Such Centers under the Categorical Clinical Center Program will also provide unique training opportunities for clinical investigators and will upgrade the quality of health care provided patients with these diseases. In 1971 five Centers will be established at a total cost of $450,000. In 1972, it is planned to continue these Centers and possibly increase the number of Centers.

International Centers for Medical Research and Training--This program promotes research and research training of United States scientists in selected foreign settings under the sponsorship and direction of four American universities and with cooperating foreign institutions and investigators. During 1971 the Program was broadened to offer scientific opportunities for investigators from all U. S. medical schools and schools of public health. The Centers now in operation provide unusual experience and exceptional biomedical research opportunities for American physicians and scientists for the long range interests of the United States. This program area will be funded at a level of $2,263,000 in 1971 and 1972.

Research Grants Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
Allergy and other immunologic disorders	$12,542,000	$12,703,000	+$161,000
Transplantation immunology	(3,386,000)	(3,429,000)	(+43,000)
Bacterial and Mycotic diseases	16,401,000	16,611,000	+210,000
Streptococcal diseases and sequelae	(984,000)	(1,013,000)	(+29,000)
Drug resistance	(6,393,000)	(6,478,000)	(+82,000)
Viral diseases and problem areas	12,223,000	13,191,000	+968,000
Infectious hepatitis	(97,000)	(101,000)	(+4,000)
Chronic and degenerative diseases	(1,563,000)	(1,583,000)	(+20,000)
Antiviral substance	(4,949,000)	(5,012,000)	(+63,000)
Parasitic diseases and problem areas	6,273,000	6,351,000	+78,000
Biological regulation of vectors	(1,510,000)	(1,524,000)	(+14,000)
Immunity to animal parasites	(1,503,000)	(1,515,000)	(+12,000)
Transmitters of disease	(1,700,000)	(1,715,000)	(+15,000)
Subtotal	47,439,000	48,856,000	+1,417,000
General research support	5,044,000	4,494,000	-550,000
Scientific evaluation	40,000	40,000	---
Categorical clinical research centers	1,266,000	1,266,000	---
International Centers for Medical Research and Training	2,263,000	2,263,000	---
Total, research grants	56,052,000	56,919,000	+867,000

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Noncompeting	788	$29,792,000	834	$32,693,000	+46	+$2,901,000
Competing	410	17,537,000	405	16,053,000	-5	-1,484,000
Supplementals	(8)	110,000	(8)	110,000	--	---
Subtotal regular programs	1,198	47,439,000	1,239	48,856,000	+41	+1,417,000
General research support		5,044,000		4,494,000		-550,000
Scientific evaluation	(1)	40,000	(1)	40,000		---
Categorical clinical research centers	8	1,266,000	8	1,266,000		---
International centers for medical research and training	4	2,263,000	4	2,263,000		---
Subtotal special programs	12	8,613,000	12	8,063,000		-550,000
Total research grants	1,210	56,052,000	1,251	56,919,000	+41	+867,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total fellowships................	$3,579,000	$3,334,000	-$245,000

The primary objective of the Fellowships Program is to increase the availability of trained professional researchers in research areas within the categorical interests of the Institute. The Program is an integral portion of the research grant and training activities which are supported by the Institute.

The postdoctoral fellowships support postdoctoral training for PH.D's and those holding other equivalent degrees. Special fellowships are for those who can justify that additional training is needed to increase their value as independent investigators. Research career development awards are for support of young investigators who plan to pursue careers in independent research and teaching and who need further experience and training.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting....	144	$2,932,000	135	$2,625,000	-9	-$307,000
b. Competing.......	5	44,000	5	44,000	--	---
2. New.................	54	603,000	46	665,000	-8	+62,000
Total...............	203	3,579,000	186	3,334,000	-17	-245,000

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Postdoctoral........	72	$620,000	61	$520,000	-11	-$100,000
2. Special.............	31	369,000	25	299,000	-6	-70,000
3. Research career:						
a. Career........	17	530,000	17	530,000	--	---
b. Development...	83	2,060,000	83	1,985,000	--	-75,000
Total..............	203	3,579,000	186	3,334,000	-17	-245,000

Fellowships Program Analysis

Fields:	1971 Estimate	1972 Estimate	Increase or Decrease
1. Allergy and Immunology.........	$1,039,000	$967,000	-$72,000
2. Bacteriology and Mycology......	964,000	897,000	-67,000
3. Biochemistry and Physiology....	610,000	570,000	-40,000
4. Parasitology and Medical Entomology.................	358,000	333,000	-25,000
5. Virology and Rickettsiology....	608,000	567,000	-41,000
Total......................	3,579,000	3,334,000	-245,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Training Grants.............	$7,280,000	$7,280,000	---

The Institute's Graduate Training Grant Program assists qualified public and non-profit institutions to establish, expand and improve training opportunities in the fields of allergy, immunology, infectious diseases, tropical medicine parasitology, and other areas of special research emphasis of the Institute. A highly trained and well-qualified pool of manpower is produced to insure the necessary scientific base for future research in these biomedical specialties. The number of individuals well-qualified for careers in teaching and related patient-care activities is also increased.

Distribution of Training Grants

	1971 Estimate			1972 Estimate			Increase or Decrease		
	No. FTE	No. Proj.	Amount	No. FTE	No. Proj.	Amount	No. FTE	No. Proj.	Amount
1. Continuations:									
a. Noncompeting..	774	129	$5,746,000	738	123	$5,625,000	-36	-6	-$121,000
b. Competing.....	108	18	997,000	120	20	1,081,000	+12	+2	+84,000
2. Supplementals....	(36)	(6)	60,000	(48)	(8)	60,000	--	--	---
3. New..............	78	13	427,000	84	14	464,000	+6	+1	+37,000
4. Scientific evaluation.....		(1)	50,000		(1)	50,000	--	--	---
Total, Training Grants.........	960	160	7,280,000	942	157	7,280,000	-18	-3	---

Training Grants (by type of program)

	1971 Estimate			1972 Estimate			Increase or Decrease		
	No. FTE	No. Proj.	Amount	No. FTE	No. Proj.	Amount	No. FTE	No. Proj.	Amount
1. Graduate.........	960	160	$7,230,000	942	157	$7,230,000	-18	-3	---
2. Scientific evaluation.....		(1)	50,000		(1)	50,000	--	--	---
Total, Training Grants.........	960	160	7,280,000	942	157	7,280,000	-18	-3	---

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	576	$7,899,000	576	$8,307,000	---	+$408,000
Other expenses..........	---	9,430,000	---	9,438,000	---	+8,000
Total.............	576	17,329,000	576	17,745,000	---	+416,000

Introduction

The research effort of the intramural program of this Institute is wide ranging. Laboratory scientists and clinical investigators, representing many disciplines,direct efforts to the discovery and exploitation of new knowledge leading to the eventual prevention and treatment of diseases caused by infection with microorganisms or abnormal immunological mechanisms. The program embraces both basic and applied research. Emphasis is on those problems difficult to accomplish under the research grant mechanism. New infectious agents are discovered, the role of new or previously recognized agents in human disease evaluated, new or improved diagnostic technics developed, host-parasite relationships studied, and therapeutic agents evaluated in animal models and human subjects.

The Institute's intramural scientific program constitutes a vital bridge between the basic research of academic institutions and applied research and technical development as represented in the Institute's collaborative research program. Collaborative programs often originate in intramural laboratories and the scientists act as both technical advisors and project officers on contracts implementing the collaborative program.

The research of intramural scientists forms an important element of the national health effort and is transmitted to the biomedical community in the more than 300 scientific publications annually contributed by the professional staff, at national and international meetings and in a wide variety of smaller meetings and seminars. In past years these contributions have made possible the solution of many problems such as epidemics of adenovirus infections and mycoplasma pneumoniae in military recruits, and Rocky Mountain Spotted Fever in civilian populations; have led to the discovery in our own laboratories of over one-half of the viruses known to cause acute respiratory infections in man, opening up the current efforts of vaccine development; have discovered and provided a method for the control of Bolivian Hemorrhagic Fever; and have provided new diagnostic and therapeutic methods to the medical profession.

Infectious diseases no longer are the major cause of death in the United States but continue to be major causes of morbidity and are responsible for a major percentage of medical costs to the public. Viruses are responsible for a high proportion of the acute illnesses. The more recent evidence for viral persistence as the underlying cause of such problems as mental retardation, progressive neurological and other degenerative diseases, and for certain types of cancer has directed the attention of intramural scientists to the difficult problems of how to diagnose and treat such viral infections. In addition to the extensive studies on slow virus diseases in animals which are models for the chronic diseases which may be caused by some viruses in man, NIAID scientists are engaged in studies of the control of viral replication using various chemical compounds or enzymes to alter the process, and as to how new immune mechanisms may be involved to halt viral damage to the host. Interferon, a naturally occurring antiviral substance in man and animals is being intensively studied and Institute scientists have led the effort to study mechanisms for inducing interferon in man and as to whether this may provide an effective means of prevention or treatment.

Immunology has been the most rapidly developing branch of biomedical science in recent years and again the scientists of this Institute have played a major role in bringing advances to bear on the problem of infection, showing that ineffective vaccines can cause an infection to worsen and that immune mechanisms at the cell surface instead of in the blood are necessary in the prevention of some virus infections. Immunological studies also support the transplantation immunology collaborative program and are beginning to define a number of the fundamental mechanisms of hypersensitivity and allergic reactions and allergy.

Laboratory and clinical research of this Institute continues to maintain field stations in Honolulu, Hawaii; Hamilton, Montana; Atlanta, Georgia; and the Panama Canal Zone. In these field locations unique opportunities are available for special epidemiological and/or laboratory studies utilizing the special environments. At the Pacific Research Section in Honolulu, studies on parasites and viral diseases are being conducted. Its special capabilities have also made it possible to initiate investigations on the biological control of mosquitoes that transmit disease. The Rocky Mountain Laboratory in Montana provides special facilities not available in Bethesda for the study of hazardous agents such as Q-fever, tuberculosis, and "slow" viruses. Atlanta provides opportunity for therapeutic studies on drug resistant malaria which has been of military, as well as civilian, importance. The Middle America Research Unit in the Panama Canal Zone affords special field opportunities to work with insect-transmitted diseases and their animal reservoirs.

The Institute also has the delegated responsibility for the Pakistan-SEATO Cholera Research Program and the Pakistan-SEATO Cholera Research Laboratory (PSCRL) in Dacca, East Pakistan. Significant advances in the understanding of the epidemiology and immunology of cholera have been achieved at PSCRL as well as testing of standard and experimental vaccines. The SEATO Cholera Research Program, coordinated with the U.S.-Japan Cholera Research Program in NIAID, is developing a toxoid which may neutralize the toxin responsible for the lethal diarrhea and afford a prolonged immunity. One of the most significant advances for the developing countries has been development of a method for oral fluid therapy which enables the intravenous fluids required to be reduced by 70 to 80 percent. Even in countries which have no capability for manufacture, distribution and administration of intravenous fluids, oral therapy by the methods, demonstrated now in several thousand patients, will afford significant reduction in mortality and has been adopted by the World Health Organization.

Program Plans in 1971 and 1972

Program plans for 1971 and 1972 are for continued redirection of the program towards those infections and immunologic disorders which are major problems.

Clinical Allergy and Immunology

The research program in allergy will be expanded as young scientists trained under Institute auspices both at the NIH and in academic centers can be enlisted to enhance the effort. An additional senior clinical investigator with expertise in the problems of clinical allergy is under recruitment and research on the problems of asthma, hayfever, and other allergies will be accelerated as rapidly as resources allow. This joint effort by the Laboratory of Clinical Investigation and the Laboratory of Immunology is being mounted in recognition of the opportunities which have been created by advances in fundamental knowledge regarding hypersensitivity which should enable many of the problems of allergy to be solved or at least minimized during the decade of the 70's. These laboratories along with the Laboratory of Microbial Immunity will continue their work to better define the mechanisms involved in the immune rejection of organ transplants and in the better understanding of the immunological processes by which tumors, infectious agents, and parasites are controlled and/or destroyed in the host. Recent findings indicating that the polysaccharides from pneumococci which are under development as a vaccine stimulate immune mechanisms differing from those of other vaccines will be accelerated because of the importance to the vaccine effort.

Twenty senior scientists and 27 junior scientists are carrying on a total of 38 distinct research investigations in these efforts and nearly 25% of the Institute's intramural financial resources are involved in their support. This represents an approximate 5% increase in level of effort over the past two years and will gradually further increase during the next year. Institute scientists also cooperate in research towards the immunoprophylaxis or immunotherapy of cancer since this is closely related to the mechanism by which the body combats other foreign organisms or abnormal cells. Promising leads are being pursued in the prevention of leukemia through immunization.

Viral, Mycoplasmal and Rickettsial Disease

Because viral infections remain a major cause of sickness and medical workload in civilian medical practice as well as being a significant cause of more serious disease, the Institute will continue to give emphasis to the unsolved problems including those of isolating the still elusive viruses responsible for many respiratory infections, a major part of the acute hepatitis cases, epidemic gastroenteritis and "slow" virus diseases. Also since there is a pressing need for effective treatment, the Institute will continue to emphasize its efforts to develop therapeutic methods.

Methods for attenuating viruses causing acute respiratory diseases have been developed which restrict the growth of these viruses to the nose. Respiratory syncytial (RS) viruses damage the lungs, causing serious illness and death in babies. Exploration of attenuated RS viruses will be continued in collaborative studies to find one which can create immunity in infants without causing illness. Similar efforts are underway and will be continued with parainfluenza viruses (the cause of croup), influenza viruses, and mycoplasma.

Studies on epidemic gastroenteritis will be continued. Infectious material known to contain a virus will be intensively studied by new technics or organ culture and viral concentration. This virus may become a candidate for a vaccine since the disease follows closely the respiratory diseases in morbidity in children.

"Australia Antigen" although patently related to acute hepatitis has not been proven to be a virus or cultured in vitro. Again, intensive efforts with organ cultures and other new technics for viral recovery will be pursued to identify the actual virus so that efforts on a vaccine can start. Work to improve diagnostic tests will be continued until the subtypes are identified and practical methods developed for use in blood banks and other diagnostic laboratories. Efforts to identify the still unknown viruses which cause other types of hepatitis will also be continued.

Work on influenza will be reoriented during the year to focus more clearly on the expected pandemic outbreak in the late 1970's and to develop methods that will enable the Department to offer better solutions to the public than has been possible in the past. This research will explore methods for creation of new influenza strains for use in vaccines, for immunological enhancement and non-specific immunity as mechanism for obtaining better protection, and for new treatment methods. The interferon system and means of enhancement of interferon production are currently under study both from the standpoint of prevention and treatment of influenza in man. These studies will be continued during the coming year using new methods of induction of interferon.

Much of the basic research in virology in the Institute's laboratories relates directly to the problem of virus induced cancer. This includes not only the studies on the mechanisms by which certain viruses are able to render normal cells malignant but cooperative studies on the role of poly I: poly C in the treatment of human cancer, work growing out of original studies by an Institute scientists in animals.

Nearly 50 of the senior professional staff of the Institute are involved in virological research conducting a total of about 62 distinct investigative efforts and consuming about 30% of the total resources available to the Institute's intramural program. The level of effort is expected to remain relatively stable during the next year.

Bacterial and Mycotic Diseases

Work on the non-living tuberculosis vaccine is now concentrated on a biochemical effort to separate the fraction responsible for protection from the rest of the cell wall of the tubercle bacillus. The whole cell wall cannot be used in an acceptable vaccine because of reactions in the lung of animals which are not related to the protective factor. New methods have been developed for the separation process and considerable progress should be made in study of the various fractions.

Effective use of pneumococcal vaccines will require the development of new tests for immune response in recipients of the vaccine. Several new methods are under study and one or more should be developed to the point of practical use during the next year.

Since major defenses against bacterial infections reside in the cell and the blood leukocyte, the role of these in the immunosuppressed patient is being studied. Infections are major problems in cancer patients undergoing chemotherapy or extensive irradiation and in patients under immunosuppression after transplant. Susceptibility may reside in preventable defects in the defense system and this will be accively pursued since antibiotic resistant organisms are the major cause of these infections in hospitals.

Parasitic Diseases

The breakthrough which will enable definition as to whether the domestic cat is responsible for the high rate of toxoplasmosis in man in the United States is being followed up, as are studies on how the disease may be eliminated from the cat.

Several parasitic diseases are of interest to allergy research because of the marked degree of hypersensitivity which marks the disease. These are being explored as possibly providing animal model systems.

The level of effort in both bacterial and parasitic diseases is expected to remain the same or decline slightly from their present level of utilizing about 20% of the Institute's intramural financial resources.

The net increase of $416,000 includes $27,000 for one additional day of pay in 1972; $125,000 for within grade increases; $23,000 for wage board pay increases; $8,000 for Federal Telecommunications system (FTS) increased costs; $274,000 for annualization of 1971 pay increase costs; and $114,000 to the National Institutes of Health Management fund for centrally furnished services, and a decrease of $155,000 in lower priority contractual support.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	36	$600,000	36	$663,000	---	+$63,000
Other expenses..........	--	11,061,000	--	11,066,000	--	+5,000
Total.............	36	11,661,000	36	11,729,000	--	+68,000

Introduction

The Collaborative Research and Development Program has as its mission the translation of significant basic research data into practical achievements of clinical applicability in immunologic and infectious diseases. It conducts and supports developmental research in the prevention, control and treatment of diseases caused by infectious agents including bacteria, viruses and parasites, and by abnormalities in the body's immune mechanisms. These activities are carried out through research contracts with industry and other Federal and non-Federal institutions. The research areas presently encompassed by the Collaborative Research Program are Transplantation and Immunology, Infectious Disease, Research Resources, and Geographic Medicine.

The primary priority of the Transplantation and Immunology Program has been to determine the utility of histocompatibility matching in the selection of tissues for human transplantation. Studies of the tissue types of donors and recipients and the continuing evaluation of recipients of typed tissues indicate the utility of matching and the relative importance of the number of tissue antigens in the organs of transplant donors and recipients. There has been a continuing increase in the utilization of the tissue typing reagents and the development of the NIH trays has provided a rapid, accurate convenient method for donor-recipients matching at transplant centers.

The Infectious Diseases Program has been broadened so that the original emphasis on developing vaccines against virus diseases now includes an attack on virus diseases through the use of antiviral substances and on bacterial diseases with vaccines against pneumococcal, streptococcal, hemophilis and influenza infections.

While the original mission of the Research Resources Program was to produce, test and distribute virus reagents, the activities now include reagents for mycoplasma, allergens and the Australia antigen which is associated with serum hepatitis. The Research Resources Program is also responsible for the management of the NIAID Molecular Anatomy Laboratory, which is designed for the purification, concentration and analysis of viruses, vaccines and reagents.

The U. S.-Japan Cooperative Medical Sciences Program is a scientific collaborative effort concerned with diseases of substantial health importance to Asian countries. The diseases or categories of diseases are 1) cholera, 2) leprosy, 3) malnutrition, 4) parasitic diseases and 5) tuberculosis and viral diseases.

Program Plans in 1971 and 1972

Allergy and Other Immunologic Disorders:

The primary mission of the Transplantation Immunology Program is to develop and manage a program designed to apply knowledge in immunology toward facilitating the transplantation of human organs and to develop and improve methods to diagnose, treat and prevent immunologic diseases.

Major emphasis will continue to be placed on the acquisition and distritubion of high-quality matching sera. Continued support will be provided for the search for new histocompatibility specificities and, with the development of improved technics for quality control, more reliable monospecific histocompatibility typing sera will be obtained. Freeze-dried sera, packaged in bulk and in preloaded trays, will be distributed to qualified investigators, thus permitting a more rapid performance of the typing procedures. Data concerning the utility of the trays and the outcome of transplants will be obtained by the program to determine the relative importance of various histocompatibility antigens. More sophisticated quality-control techniques will be used to check the stability of sera in clinical usage and the accuracy and the reproducibility of the typing results of various laboratories. A limited number of program-supported research laboratories will be funded to conduct research in the efficacy of typing and to develop and compare a variety of new technics. Support will not be provided for the operation of typing service laboratories. In a joint NIH effort, support will be provided for the collection of clinical and immunological data on a variety of human organ transplants.

An increasingly larger percentage of the budget will be spent in the development of facilities to test and evaluate the efficacy of new immunosuppressive therapies. More potent drugs, antilymphocyte sera and soluble antigens preparations will be studied first in sub-human primates and eventually in human transplant patients. The ultimate goal of this program is to provide safe and more effective means of preventing and treating graft rejection.

The Institute will continue to support, on a small scale, investigations into the immunological consequences of transplantation. These include: studies of the reoccurrence of primary disease in immunosuppressed patients, graft versus host disease, and a systematic evaluation of some of the more rare immunological changes seen in transplant patients. These studies will lead to a more thorough understanding of the mechanisms of graft rejection and may be useful in the early diagnosis of complications in transplant patients. Studies in the solubilization of histocompatibility antigens, their characterization and biologic testing will be expanded. Soluble antigens obtained will be used to produce specific histocompatibility antisera and also study the induction of specific tolerance in animals.

Through the Research Resources Program the Institute has produced and is now prepared to distribute a highly purified ragweed pollen known as Antigen E. This material will be evaluated both in the research laboratory and in clinical research in human allergic disorders. Other ragweed antigens including Antigen K and RA-3 will be purified, tested and distributed for research in allergic disorders. Efforts in developing and evaluating purified allergy reagents and improved allergy test systems are closely linked to the Institute's developing program for support of centers for research in allergy.

Viral, Mycoplasmal, Bacterial and Rickettsial Diseases:

The Infectious Diseases Branch will be concentrating on 3 major areas for development: (1) Virus Vaccines - The Institute will continue to develop and evaluate vaccines designed to protect pediatric populations, in particular against respiratory diseases due to Respiratory Syncytial virus, parainfluenza and adenovirus. Efforts will continue in the comparative studies on various methods for immunizing against smallpox for the purpose of finding a vaccine strain and method of injection which will lessen the risk of adverse reactions. The Institute will develop a program to utilize existing knowledge and promote needed research for the purpose of lessening the impact of the expected pandemic outbreak of influenza. (2) Bacterial and Mycoplasma Vaccines - The Institute will evaluate on an increasing scale the vaccine which it has had produced against pneumococcal pneumonia. After safety and efficacy testing is complete the pneumococcal vaccine will be field tested in populations in which pneumococcal infections are a serious health problem. Studies and surveys to date indicate that pneumococcal infections are a serious health problem in selected populations causing pneumonia, otitis media and meningitis and having considerable economic impact because of the hospitalization required in patients.

The Institute plans to conduct safety and efficacy studies on a vaccine against meningococcal meningitis. Two strains of this vaccine have already been produced for military use and the Institute will evaluate the same vaccine in young adults and children. Should these preliminary tests be successful, the Institute will procure additional lots of vaccine, including quantities representing a third strain.

The Institute will initiate testing and possible scaled up production for a vaccine against meningitis due to H influenzae. This is a serious crippling disease of children that is probably preventable by immunization.

Among the important causes of pneumonia is the organism Mycoplasma pneumonia. A new vaccine being developed through the Institute's Collaborative Research Program is expected to provide an effective means of control. Small lots have been prepared, tested and demonstrated to be capable of producing protective antibody. It is planned that developmental studies will lead to scaled up production and evaluation efforts in 1972. (3) Antiviral Substances - As a result of research efforts supported to a large measure by NIAID grants and a strong intramural base, a systematic contract program has been launched to develop and test a variety of chemical and biological materials having potential use in preventing and treating viral diseases. Greatest potential application for the antiviral substances is in diseases not readily preventable through vaccines. The Institute plans on moving from a materials-production phase to new phases, including evaluation of the antivirals in animal models; theraphy of human disease; improved production purification and assay methods; a search for means of enhancing effectiveness and reducing toxicity of materials; and investigation of potential antivirals.

Through the Research Resources Program, the NIAID will continue to distribute and evaluate the interim reagents which it has produced for the Australia Antigen (Au) associated with serum hepatitis. These critically needed reagents will be supplemented with reagents that are even more sensitive in detecting Au antigen-containing blood. Elimination of Au positive blood donors has already reduced hepatitis acquired through blood transfusions. Concerted efforts will be made to purify the Au antigen and elucidate its physical, chemical and biological nature, this is actively being carried out in the Institute supported AEC-NIAID Molecular

Anatomy Laboratory. It is planned to support efforts to propagate hepatitis virus in cell culture and animal model systems, recognizing that only through breakthroughs in this area can a vaccine against hepatitis be realized.

The Geographic Medicine Branch manages a research program designed to study diseases affecting the health of millions of people in the world. The various projects are supported by a carefully coordinated grant and contract program. Data reported at Workshops, Conferences, and Joint U.S.-Japan Meetings indicate advances in each of the disease categories being pursued.

In cholera research, progress has been made in each of the three major priority areas, including the development of a more effective vaccine, the delineation of the mechanism by which the cholera toxin causes intestinal fluid loss, and the isolation of bacterial exotoxins responsible for non-vibrio, cholera-like disease. Following the initial suggestion that the exotoxin induced electrolyte secretion is mediated by cyclic adenosine monophosphate, it has been clearly demonstrated that gut electrolyte secretion can be initiated by other agents which increase intracellular cyclic adenosine monophosphate levels. As the result of studies in this area, a number of agents known to inhibit intracellular cyclic adenosine monophosphate accumulation are now being investigated to ascertain their possible practical value in rapidly blocking the gut fluid loss in cholera patients. Excep during major cholera epidemics, the so called cholera-like diseases result in grea er morbidity and mortality than endemic cholera infections. A number of carefully designed studies of the pathogenetic and immunologic aspects of cholera-like diseases are currently underway.

In the field of leprosy investigators continue to make progress in major priority areas including pharmacology of antileprotic drugs, chemotheraphy trials with promising new compounds, cultivation of the leprosy bacillus *in vitro* and *in vivo*, and the role of the immune mechanism in this disease.

Recent investigations have shown that the principal metabolite of dapsone (DDS) in plasma, MADDS (monoacety 1 DDS) is enzymatically acetylated by the same enzyme system which acetylates isoniazid and sulfonamides. Preliminary information obtained from a clinical trial using various doses of clofazimine (B663) indicate that this drug is effective, although long-term follow-up will be necessary before a final evaluation can be made. In an attempt to prevent the emergence of drug resistance, combinations of antileprotic drugs will be used in chemotherapy trials. Specially, a trial is planned using DADDS and rifampin, a drug used successfully in treating tuberculosis. Leprosy patients often demonstrate deficient cellular immunity and attempts now focus on the mechanisms underlying this deficiency.

Additional data confirm earlier reports that severe Malnutrition during the first two or three years of life, even though dietary adequacy is later provided, has a lasting detrimental effect upon intelligence and behavior in later life. It is anticipated that highly sophisticated neuropsychiatric and neurophysiologic methodolgy currently being developed and applied will provide the basis for more exacting quantification of brain functions and allow more precise evaluation of the influence of early malnutrition thereon. Also under investigation in several countries is the prevalence and frequency of iron and protein deficiency in children and of folic acid deficiency in pregnant women. Other research in progress endeavors to explain, and find means of correcting, the poor absorption of iron from cereal grains.

Parasitic disease research is limited to schistosomiasis and filariasis. During the past year, new compounds have been developed and tested against schistosomiasis. One study is exploring the relationship between chemical structure and configuration compared against antischistosomal activity in vitro of heterocyclic compounds. Work is in progress to develop an economical "bait" formulation containing molluscicidal compounds for the snail vectors of schistosomiasis in order to eliminate the environmental contamination resulting from current snail control procedures. Efforts have continued to synthesize antifilarial drugs, which have been thoroughly tested in animal models. Although no compounds have been demonstrated to be more active than diethylcarbamazine, these studies are adding to the limited knowledge in this field.

Tuberculosis research work has been limited to the pathogenic and immunologic aspects of tuberculosis. An important objective of the program is to find a practical animal model which gives results relevant to the immunity that exists in humans against naturally acquired tuberculosis infection. With such a model, improved tuberculosis vaccines, both living and non-living, could be developed for clinical use. In order to encourage and stimulate studies of the immunology of tuberculosis and the basic mechanisms of cellular and humoral responses to infection and disease, special reagents, difficult to prepare and not readily available, have been made available to qualified investigators. These include: living, frozen mycobacterial cells of the Glaxo vaccine strain of BCG; lyophilized PPD tuberculin; a large number of fully characterized mycobacterial strains; and specific rabbit antisera against many strains of mycobacteria. A reference kit, including antigen and antiserum, has been prepared and is being tested by a number of investigators as a possible reference system in the study of mycobacterial antigens.

During the past year, the guidelines of the viral diseases program were revised to limit the areas of scientific involvement to rabies and the arboviruses, with emphasis on dengue and the pathogenesis of hemorrhagic fever. Progress has been been made in these areas and is expected to continue during the coming year.

The increase of $68,000 includes $2,000 for one additional day of pay in 1972, $9,000 for within grade increases, $52,000 for annualization of 1971 pay increase costs, and $5,000 to the National Institutes of Health Management fund for centrally furnished services.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	43	$662,000	43	$703,000	---	+$41,000
Other expenses..........	--	965,000	--	1,011,000	---	+46,000
Total..............	43	1,627,000	43	1,714,000	---	+87,000

These funds provide for the over-all coordination and administration of the Institute's grants programs. The activity is responsible for planning and developing scientific programs for research and training grants and fellowship awards. This involves the collection, processing, review and evaluation of applications, support of the National Advisory Allergy and Infectious Diseases Council, liaison with appropriate organizations and scientists, continual vigilance by professional staff of program progress on scientific activities and surveillance by supporting personnel on recording and reporting of varied information concerning grant management.

The increase of $87,000 includes $2,000 for one additional day of pay in 1972, $10,000 for within grade increases, $29,000 for annualization of 1971 pay increase costs, and $46,000 to the National Institutes of Health Management fund for centrally furnished services.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	32	$489,000	32	$510,000	--	+$21,000
Other expenses..........	--	107,000	--	111,000	--	+4,000
Total..............	32	596,000	32	621,000	--	+25,000

These funds provide for the support of the Institute Director and his immediate staff, including public and scientific information activities, in the overall administration, coordination and direction of all the Institute's activities. The increase of $25,000 includes $2,000 for one additional day of pay in 1972, $6,000 for within-grade increases, $13,000 for annualization of 1971 pay increase costs, and $4,000 to the National Institutes of Health Management fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants - (Public Health Service Act, Title IV - Part D.)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$56,052,000	Indefinite	---	$56,919,000

Purpose: The purpose of the Research Grants Program is to support research on the causes, characteristics, prevention, control, and treatment of diseases believed to be caused by infectious agents including bacteria, fungi, viruses, and parasites --or by abnormalities in the body's immune mechanism such as allergies.

Explanation: The Institute sponsors over 1,200 research projects at universities, hospitals, research institutions and other private or non-profit institutions. Grant supported projects vary from the relatively circumscribed activities of an individual scientist to broadly-based programs that integrate the effort of groups of investigators in a variety of scientific disciplines.

Accomplishments in 1971: The Institute continued its efforts to stimulate further research and interest in transplantation immunology, allergic and immunologic diseases, chronic and degenerative diseases, bacterial and mycotic diseases, viral diseases and problem areas, parasitic diseases, and provided special research grant support for the Gorgas Memorial Institute, Categorical Clinical Research Centers and International Centers for Medical Research and Training. Management of the Gorgas Memorial Institute was transferred to the Fogarty International Center in 1971.

Objectives for 1972: The program for 1972 is designed primarily at maintaining the basic research program close to its present level, while increasing selected areas of high priority. Special programmatic emphasis will center on transplantation immunology, viral, bacterial and mycotic, chronic and degenerative diseases, and clinical allergy areas.

Program Purpose and Accomplishments

Activity: Fellowships - (PHS Act, Title IV, Part D.)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$3,579,000	Indefinite	---	$3,334,000

Purpose: The Fellowship Program purpose is to raise the level of competence and increase the availability of trained professional researchers in research areas within the categorical interests of the Allergy and Infectious Diseases Institute.

Explanation: This program supports (a) postdoctoral awards for the training of PH.D's, M.D. and those holding other equivalent degrees, (b) special awards for those who can justify that additional training is needed to increase their value as independent investigators and whose needs are not met by other fellowship programs, and (c) Research Career Development awards for support of young investigators who plan to pursue careers in independent research and teaching and who need further experience and training.

Accomplishments in 1971: This Institute will support approximately 203 fellowship awards in the following areas of concern: Allergy and Immunology, Bacteriology and Mycology, Biochemistry and Physiology, Parasitology and Medical Entomology, and Virology and Rickettsiology.

Objectives for 1972: Funds requested in 1972 would support 186 awards.

Activity: Training Grants - (PHS Act, Title IV, Part D.)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$7,280,000	Indefinite	---	$7,280,000

Purpose: The general purpose of these awards is to support graduate training leading toward careers of research related to medicine and health, or toward increased competence in the treatment of diseases of rapidly expanding areas of prime concern, such as immunology and virology.

Explanation: Graduate training grants are awarded to assist public and other nonprofit institutions to establish, expand, or improve training opportunities in the health related sciences for persons interested in careers in research, teaching, and in certain designated areas, clinical service. In addition to providing support of the institutions program, these grants may also provide funds for stipends and allowances awarded by the institution to trainees selected by the institution.

Accomplishments in 1971: The Institute will make approximately 160 separate awards to provide training support for the full-time equivalent of 960 trainees in areas of special interest to the Institute.

Objectives for 1972: Funds requested for 1972 would provide the same dollar level as in 1971 and will support 157 awards and result in the training of approximately 942 trainees.

Activity: Laboratory and Clinical Research - (PHS Act, Title IV, Part D.)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
576	$17,329,000	Indefinite	576	$17,745,000

Purpose: This activity involves research performed by scientists and other research personnel of the Institute's intramural staff who are assigned to the Institute's various laboratories and the central clinical facility.

Explanation: The Laboratory and Clinical Research activity is conducted at laboratories in Hamilton, Montana; Honolulu, Hawaii; Atlanta, Georgia; and the Panama Canal Zone, as well as Bethesda, Maryland. These research efforts are directed to the discovery and exploitation of new knowledge leading to the eventual prevention and treatment of diseases caused by infection with microorganisms or by abnormal immunological mechanisms, and embraces both basic and applied research.

Accomplishments in 1971: Attenuated strains of respiratory syncytial (RS) virus were used as a live vaccine in children down to the 2-year old age range in a collaborative research program at Childrens Hospital in Washington without causing illness or other ill effects. A new and more sensitive test system for "hepatitis associated antigen" was validated and enabled demonstration of immunity in both chimpanzees and man which had been missed by previous methods, thus opening new avenues for research in hepatitis. Further progress was made on identification of the active fraction of killed tuberculosis vaccine and in establishing an animal model system for evaluation of live tuberculosis vaccine (BCG.) Toxoplasma gondii, cause of a common U. S. parasitic disease with eye damage, was shown to be a protozoa and the mechanisms by which cats can act as reservoirs demonstrated. Rifampin, an antibiotic, was shown to block the intracellular assembly of some viruses and further work was undertaken to define its potential as an antiviral for man. A program in research on clinical allergy was initiated.

Objectives for 1972: Further development of the research on clinical allergy will be pursued as resources permit. The evaluation of the attenuated RS virus vaccine will be continued as well as efforts to develop better vaccines for other respiratory viruses. Efforts to isolate and identify hepatitis viruses will be expanded as well as research on the subtypes of "hepatitis associated antigen." Work on a killed tuberculosis vaccine will advance. Immunologic research will center more on the problems of allergy and transplantation and more scientists will be used in support of the collaborative programs.

Activity: Collaborative Research and Development - (PHS Act, Title IV, Part D.)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
36	$11,661,000	Indefinite	36	$11,729,000

Purpose: This activity has as its mission the translation of significant basic research data into practical achievements of clinical applicability in immunologic and infectious diseases. It conducts and supports developmental research in the prevention, control and treatment of diseases caused by infectious agents including bacteria, viruses and parasites and by abnormalities in the body's immune mechanism.

Explanation: This activity is carried out through research contracts with industry and other Federal and non-Federal institutions.

Accomplishments in 1971: In the transplantation immunology program evidence continues to accumulate as to the value (in man) of tissue typing reagents and (in monkeys) of antilymphocyte serum in prolonging grafts. In the respiratory diseases program evaluation of vaccines against the 14 most common pneumococcal types has begun. In a number of viral diseases nasal antibody now seems to be the most important determinant of resistance to disease. Antiviral substances, specifically interferon and its inducers, are effective in curing or preventing certain diseases in animal model systems. Reagents for viruses, interferon standards, and the Australia antigen (which is associated with serum hepatitis) have been produced and distributed to facilitate research.

Objectives for 1972: Efforts to identify the antigens important in tissue matching will be intensified. Isolation of large quantities may make it possible to induce tolerance to the specific antigens and hence increase the likelihood of successful transplant. Evaluation of a large lot of rabbit lymphocyte globulin will be undertaken with a similar end in view. Preliminary studies will be undertaken of new vaccines against the diseases caused by the bacteria, H. influenza and meningococcus (both frequent causes of meningitis and middle ear infections) and by the smallpox, parainfluenza and respiratory syncytial viruses. The pneumococcal vaccine studies will be expanded to include polyvalent vaccines. Purified interferon will be prepared and tested as an antiviral prophylactic or therapeutic agent.

Activity: Review and Approval of Grants - (Public Health Service Act, Title IV, Part D.)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
43	$1,627,000	Indefinite	43	$1,714,000

Purpose: This activity provides for the over-all coordination and administration of the Institute's grants programs.

Explanation: The activity is responsible for planning and developing scientific programs for research and training grants and fellowship awards. This involves the collection, processing, review and evaluation of applications, support of the National Advisory Allergy and Infectious Diseases Council, liaison with appropriate organization and scientists, continual vigilance by professional staff of program progress on scientific activities and surveillance by supporting personnel on recording and reporting of varied information concerning grant management.

Accomplishments in 1971: A study was initiated to identify appropriate criteria for judging the health relevance of research projects to the mission of the Institute. Procedures were designed to meet new grantee equipment accountability requirements. Plans were made to convert to a central indirect cost management system.

Objectives for 1972: Increased effort will be made for developing an effective and responsive grants management and evaluation program for the research and training grants and fellowship activities.

NATIONAL INSTITUTES OF HEALTH

National Institute of Allergy and Infectious Diseases

Program Purpose and Accomplishments

Activity: Program Direction - (Public Health Service Act, Title IV - Part D.)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
32	$596,000	Indefinite	32	$621,000

Purpose: This activity provides for the support of the Institute's Director and his immediate staff in the over-all administration, coordination and direction of all the Institute's activities.

Explanation: The personnel to support this activity include Personnel Office, Financial Management Office, Travel, Mail and Files, Information, etc.

Accomplishments in 1971: The Biostatistics Unit, staffed by two professional personnel was established in the Office of the Director. It is expected that this unit will conduct in-house and contract activities to develop information on selected disease problems.

Objectives for 1972: To continue to look for better and more effective ways of providing Institute direction through reorganization and initiation of new policies.

National Institute of Allergy and Infectious Diseases

STATEMENT OF DR. DORLAND DAVIS, DIRECTOR

ACCOMPANIED BY WALTER MAGRUDER

BUDGET REQUEST AND 1971 APPROPRIATION

Senator Magnuson. Allergy and infectious diseases next.

Dr. Davis.

For the record, Dr. Davis, you were $98,124,000 last year, and this year's budget is $99,342,000. You are about the same as you were last year.

Dr. Davis. Yes. That is correct.

Senator Magnuson. Go right ahead, Doctor.

Dr. Davis. Mr. Chairman, the National Institute of Allergy and Infectious Diseases supports and conducts, as you know, research on allergy and infectious diseases. This includes a very wide variety of conditions and disorders which are caused by viruses, fungi, and bacteria.

I won't cover all the work we are doing but I would like to mention just three areas of research in which we are engaged at the moment and in which we think real progress is being made.

The first of these deals with allergic diseases, including asthma.

Senator Magnuson. How much of the 99 goes into that department?

Do you have a breakdown, or do they all go together?

Dr. Marston. We have estimates.

Dr. Davis. We estimate that about 25 percent of our resources, that is, $25 to $30 million, goes into research on allergic diseases and immunological diseases.

Senator Magnuson. The rest would go into the other two programs?

Dr. Davis. The 25 percent is divided between the intramural program and the grants program and the collaborative program.

31 MILLION U.S. ALLERGY PATIENTS

We estimate 31 million Americans, 15 percent of the population, have one or more allergies. These include such things as asthma—the most serious of all, hay fever, food sensitivities and drug sensitivities.

This figure does not include such so-called minor things as poison ivy and insect bites.

Senator Cotton. You name the principal ones.

Dr. Davis. Asthma is the most important allergic disease. I am talking about allergic or immunologic diseases for the moment.

Later I will discuss some of the infectious diseases.

Asthma is the big one.

Senator Cotton. Asthma leads into other things?

Dr. Davis. No. Asthma is really a definitive and very serious disease. There are 4,000 to 5,000 people who die of asthma every year. Probably more important, it is a cause of very great disability, particularly in young children. Young children develop this disease in early life. They are seriously handicapped. Their schooling is interrupted. Their whole career is changed simply because of this disability.

There are a number of hospital schools around the country, as you probably know, which deal specifically with asthmatic children.

Senator MAGNUSON. My personal observation is that you are correct. I go out to Bethesda every once in a while to the allergy people and get all those tests. If you go in there at 10 o'clock in the morning, if there are 20 people waiting in there, about 18 are young kids, real young children, waiting to get in.

Dr. DAVIS. This is where the problem is which we think we can do something about, by getting it early and trying to spare these children a life of disability.

ASTHMA AND BRONCHITIS DISTINCTIONS

Senator MAGNUSON. What is the difference between asthma and bronchitis?

Dr. DAVIS. Asthma is basically an allergic or immunologic reaction of the individual. What happens is that the bronchii, the bronchial tubes which carry the air into the lungs, become constricted by the smooth muscles in their walls. So, it is just as though the whole air supply is cutoff from these individuals.

Whereas, bronchitis is an infection of the bronchial tubes, of the lining of the tubes in which you get a lot of secretions.

Senator MAGNUSON. What causes bronchitis, an allergy?

Dr. DAVIS. Primarily, it is a bacterial infection; although it may be combined with allergy. When combined, it is difficult to manage clinically.

Senator MAGNUSON. All of the patent medicines you see advertised merely give you some temporary relief? Is that all they do for you?

Dr. DAVIS. Yes.

Senator MAGNUSON. You pick up a newspaper, we have a sure cure, put your nose into something and breathe.

Senator COTTON. I can tell you they are no good.

Dr. DAVIS. This is a very difficult group of diseases to treat and manage. We have not made too much progress yet.

(Discussion off the record.)

Senator MAGNUSON. Now we will go back on the record after that free medical advice.

All right, Doctor.

CLINICAL APPLICATION OF PATHOLOGICAL PROCESSES OF ALLERGIC DISEASES

Dr. DAVIS. For the last 15 years, Mr. Chairman, this Institute has emphasized research in the basic immunology in trying to seek the answers to some of these allergic disorders. This field has advanced extremely rapidly. We now understand much better than we ever have before what are the underlying pathological processes which go on in allergic disease. So much so, that we believe that we are at a stage where we can translate much of this new fundamental knowledge into clinical application.

IMMUNO-GLOBULIN E

For example, one of our scientists supported by NIAID, who was in Denver but now at Hopkins, has discovered a special antibody in the blood called immuno-globulin E. This seems to be the agent which is responsible for allergic conditions.

It reacts with a specific antigen and leads to the chain of chemical events which produces the symptoms of hay fever and other allergic conditions.

Histamine and a Slow Reacting Substance

There are other body chemicals such as histamine and a slow reacting substance which are produced and which cause physiological changes.

ALLERGIC DISEASE CENTERS

Now, in view of the findings such as this, we have established, as we described last year in testimony, seven allergic disease centers throughout the country where the clinical aspects of allergic disorders including asthma can be studied in conjunction with existing high-quality programs in immunologic research.

Senator Magnuson. Before you go into what the centers do, do we make a full grant to the centers or is matching required?

Dr. Davis. No. This is a direct grant.

Senator Magnuson. A direct Federal grant?

Dr. Davis. Yes.

Senator Magnuson. To maintain the centers?

Dr. Davis. Yes. These are not large grants at the present time.

Unfunded Training Opportunity

Senator Magnuson. Do you do some training there, too?

Dr. Davis. They offer an opportunity for training but at the moment—and we are just beginning them—there are no special training funds in the awards. But they would serve as an excellent place in which physicians could receive the very highest quality training for the care of allergic diseases.

Diagnoses, Prevention, and Treatment

The centers will direct their efforts at diagnoses, prevention, and treatment of these allergic diseases I mentioned, allergy, hay fever, and eczema which is a very important disease.

Senator Cotton. They are not just research centers.

Dr. Davis. Primarily research, yes, and they will do clinical studies on patients.

The point is to bring together in a favorable setting high-quality research scientists doing innovative work along with skilled physicians and primarily dealing with out-patients, not hospital patients.

Center Locations

Senator Cotton. Where are the others located besides the State of Washington?

Dr. Davis. Actually in the State of Washington there is a clinical research center already going, where Dr. Van Arsdale, who is a very well-known and competent allergist, and currently president of the American Academy of Allergy is conducting research on allergic diseases.

Senator Magnuson. Does he get a grant?

Dr. Davis. He has a general clinical center grant and he has other grants.

Senator Magnuson. You did not answer his question. Where else do you have one?

Dr. Davis. We have one in Boston, at the R. B. Brigham Hospital; one in Johns Hopkins University in Baltimore; one in Washington University in St. Louis, Mo. one at the University of Wisconsin in Madison; one at Scripps Clinic and Research Foundation in La Jolla, Calif.

Then we have two in Denver, one at the Children's Asthma Research Institute and Hospital and at the National Jewish Hospital Research Center.

EFFECT OF ATTITUDE ON ALLERGIC DISEASES

Senator Magnuson. That brings me to this point: Does altitude have any effect on the allergy diseases such as asthma? Is a high altitude better to live in or low altitude?

Dr. Davis. Generally, but it seems to vary with the patient. It is not true that patients, by moving to another area, can always alleviate their symptoms. They might be improved for a while but experience shows that they seem to have about the same kind of problems no matter where they live.

Senator Magnuson. I am doing a little clinical research, myself. I know a lot of people when they get up in an airplane feel better and they drain more because for some reason the pressure seems to affect them one way or another.

Dr. Davis. Yes.

Senator Magnuson. That would be correct?

Dr. Davis. Yes.

Senator Magnuson. Some do and some don't.

Dr. Davis. Yes. Sometimes it is a temporary thing.

Senator Magnuson. It is temporary. It will last 5 or 6 hours sometimes after you get off an airplane; then it will clear up.

INFECTIOUS RESPIRATORY DISEASES

Dr. Davis. I mentioned the two centers in Denver.

I would like now to go on rather quickly to another major subject, namely, the infectious respiratory diseases, with which our Institute is concerned. These include both the bacterial diseases such as pneumonia—pneumococcal pneumonia—and the viral diseases.

Use of Penicillin for Pneumoccal Pneumonia

Despite the fact that penicillin is extremely helpful in the care of patients with pneumococcal pneumonia and the death rate has been reduced, there are still some 25,000 to 40,000 deaths a year due to pneumococcal bacterium in this country.

There are some 300,000 people who are hospitalized every year because of pneumococcal pneumonia.

Penicillin Allergy

Senator Magnuson. I don't like to belabor this but what about people who are allergic to penicillin?

Dr. DAVIS. This is a problem. The only thing that the physician can do is to determine before he administers the penicillin whether or not the patient is in fact allergic.

Some skin tests have been developed within the last 4 or 5 years. There are really now in the stage of evaluation, but they seem to be very promising and should tell precisely whether the patient would react to penicillin if it were injected.

Senator COTTON. Can a patient be allergic to penicillin at some times and not at others?

Dr. DAVIS. Yes; this is true.

Senator Cotton. For years, on several occasions I took penicillin with no reaction. Then I took penicillin and had one terrible time.

Does that necessarily mean that I mustn't ever take penicillin again?

Dr. DAVIS. Physicians who are studying this—one of them is Dr. Levine at New York University—tell me that this is quite true. One may develop a sensitivity to penicillin after receiving several shots. But in some cases after a period of years he seems to lose the sensitivity. That is why it is important to have this test developed and properly evaluated so that a precise determination can be made at the time the patient needs penicillin.

If it is negative, the physician can go ahead and treat him with penicillin. Penicillin is the best treatment for pneumococcal pneumonia. But if you can't use that, you can use other drugs.

Dr. MARSTON. It becomes very important that you always let the physician know that you have had a reaction to penicillin for the rest of your life.

Senator MAGNUSON. This is the point I was coming to.

Supposing you are in an accident and you can't let them know. Do you advocate that we should do as much as we can to have people tested for penicillin and if they find they are allergic to it or it has a reaction—I know some people, I am sure you do, too, that carry around along with their driver's license or in their pocketbook, "No penicillin," to let them know.

The only time I have ever had penicillin was when I had a fever one time, a strong fever, they gave me penicillin. The fever disappeared after 5 or 6 days. So, help me, 2 weeks later I broke out all over.

Dr. DAVIS. Yes; that is right.

Senator MAGNUSON. Really, I looked like the coming of spring. So, I should say you should not give me penicillin.

Dr. DAVIS. I think the physician would think a long time before giving any such patient penicillin.

Senator MAGNUSON. This was 2 weeks afterwards.

Dr. DAVIS. These tests are not in a stage where one could advocate them for widespread use but they would be very useful for a physician who uses them in a hospital and where penicillin is the drug of choice and he does not want to use another drug.

ASPIRIN ALLERGY

Senator MAGNUSON. Now let me ask you another question on allergy. How many people are allergic to aspirin? A great percentage?

Dr. DAVIS. No.

Senator MAGNUSON. But there are a great number?

Dr. DAVIS. There are quite a number of people who are allergic to aspirin but it really is not a very large proportion of the population. This has been studied in the last few years.

Actually, one of our staff members in Bethesda is studying this.

Senator MAGNUSON. If they want a temporary pain reliever, you have to find something else for them?

Dr. DAVIS. That is right.

Senator MAGNUSON. Such as tylenol or something like that?

Dr. DAVIS. Well, there are a number of analgesics.

Senator MAGNUSON. A number of them that don't contain aspirin?

DEVELOPMENT OF VACCINE AGAINST PNEUMONIA

Dr. DAVIS. Right.

I did want to mention that because of this problem of pneumococcal pneumonia we are working on a vaccine which if it holds up to the promise which it seems to have now, should be available for patients who are in particularly susceptible age groups. These would be people over 50 years of age, and certain population groups such as the American Indian who suffer from a very high incidence and death rate of pneumococcal pneumonia.

Senator COTTON. Do you do that by contract?

Dr. DAVIS. This is primarily contract, mainly with universities. Most of this work is being done at the University of Pennsylvania by Dr. Robert Austrian, who has studied pneumonia for many years and maintained an interest in it when other people felt that it could be controlled by antibiotics. We are supporting his work which is being done in many parts of the country.

Senator COTTON. Are the drug companies doing anything on that?

Dr. DAVIS. Yes. We have a contract with them to actually make the vaccine material. We also have an agreement with the Indian Health Service to evaluate the material to see whether it is as good as we think it is.

Senator MAGNUSON. Do you have a project in Alaska?

Dr. DAVIS. No; we don't, not in Alaska; but we do in the Southwest with the Indian Service.

Senator MAGNUSON. Of course, the Aleuts and the Eskimos have a very high mortality rate.

Dr. DAVIS. Yes, the other thing about the Indian population and the Alaska natives is that the children have a very high incidence of otitis media which causes deafness in a large proportion of them. It now is apparent this is very frequently due to the pneumococcus organism, the same organism that causes pneumonia in adults. I will place a position paper in the record.

(The information follows:)

NATIONAL INSTITUTES OF HEALTH
National Institute of Allergy and Infectious Diseases

RESPIRATORY VACCINES

Introduction

At a time when vaccines and "wonder drugs" are available for the prevention and cure of many infections, one is often led to assume that acute respiratory diseases have been conquered. Yet illnesses, such as "flu," colds, and pneumonia, remain important public health problems and continue to exact a tremendous physical and economic toll from our country.

Some respiratory illnesses, such as the "common cold," result in nothing more than transient discomfort; others, such as influenza, pneumonia, and RS (respiratory syncytial) disease of infants, can be killers. Over 70,000 people each year die from respiratory infections, accounting for more than half of all deaths caused by infectious diseases.

Through the management of a collaborative (contract) research program, support of a research grant program, and conduct of intramural research efforts in its laboratories at Bethesda, Maryland, the National Institute of Allergy and Infectious Diseases (NIAID) is responsible for the Government's main efforts to solve the problems of acute infectious respiratory disease in this country.

Table of Obligations - Respiratory Vaccines*

	1968	1969	1970	1971 (est.)	1972 (est.)
NIAID	2,719,000	3,308,000	3,512,000	3,611,000	3,611,000

Adenovirus Vaccines

At one time epidemics of acute respiratory disease, severe enough to require hospitalization, would sweep through military recruit training camps every year. These epidemics ranked next to accidents as a cause of lost manpower. Today, through a collaborative research effort involving the NIAID, pharmaceutical houses, and the military, vaccines are available to protect against adenovirus types 4 and 7 -- two of the major causes of acute respiratory disease in military recruit populations.

The live adenovirus vaccine success story began in 1965 with the results of the first field trials of an adenovirus type 4 vaccine, developed by NIAID and produced by Wyeth Laboratories. This vaccine, taken in capsule form, represented not only a successful means of preventing massive and expensive epidemics at boot camps, but also represented a new concept in immunization against respiratory disease.

A special coating on the capsule prevented the vaccine from being released until it reached the intestinal tract. The live vaccine, thus, bypassed the normal site of adenovirus infection, the respiratory tract. Once in the intestinal tract the vaccine caused a symptom-free infection that was sufficient to stimulate the production of protective substances known as antibodies. This vaccine has now been successfully administered to over 750,000 military recruits.

---

* Includes laboratory and clinical research, and collaborative research; excludes research grants, fellowships, training grants.

With knowledge gained from the development of type 4 vaccine and with new epidemiologic data gathered at military camps, a new collaborative effort was begun to find a preventive measure for another common adenovirus culprit -- this time adenovirus type 7.

Now, an adenovirus 7 vaccine, also prepared by Wyeth Laboratories, has been administered to over 30,000 recruits who, simultaneously, received the type 4 vaccine. Both vaccines appear to be 95% effective against natural adenovirus disease and no untoward reactions have occurred. Data from a recent study carried out by the military have shown that the two vaccines, administered simultaneously, do not interfere with the protection afforded by each. This means that two more disease deterrents are available for use at the first sign of an outbreak. Routine immunization, however, must await further study of how eradication of these viruses will affect the presence or emergence of other adenovirus strains.

Presently, NIAID is supporting preliminary testing of a vaccine against a third common offender -- adenovirus type 21. Vaccines against types 1, 2, and 5 also appear promising.

Basic studies of the biology of adenoviruses are continuing. Scientists hope that these studies will enable the development of purer vaccine preparations.

Common Cold Studies

The National Center for Health Statistics reported that during a one year period beginning July, 1967, Americans suffered more than 90 million colds. These illnesses resulted in some 234 million days of restricted activity and a loss of 36 million school days, and 32 million work days.

Statistics, however, do not even begin to reflect the true toll these illnesses take in reduced vitality, decreased efficiency, below standard productivity and personal discomfort.

Known as "the common cold", the syndrome is common only in symptoms and frequency of occurrence. Almost all colds are believed to be caused by viruses, but only 1/2 of these illnesses can be blamed on a specific organism. In fact, there are now at least 89 officially recognized rhinoviruses (34 more than were reported last year) and some 23 corona viruses. These have all been demonstrated as causes of the common cold. Many of these viruses were isolated in NIAID laboratories and in Institute-supported rhinovirus typing centers and research laboratories throughout the world.

Efforts to identify cold agents, determine their prevalence, and group them according to shared characteristics are continuing, but the problems of common cold research are labyrinthine.

Early in the study of colds it was suggested that a "cocktail" vaccine might be developed against the most common rhinoviruses. But, the great number of rhinoviruses and the absence of any one or any few major cold-causing viruses has made the possibility of producing such a combined vaccine extremely unlikely.

Although scientists have not yet solved the problem of the multiplicity of cold-causing viruses, they have learned that the route of immunization plays an important role in determining whether a vaccine will be effective. One vaccine administered intramuscularly offered little protection against experimental infections. When researchers administered the vaccine in the form of nosedrops or as a nasal spray, however, a significant number of the vaccinated individuals resisted infection.

Knowing at least some of the causes of the common cold allows scientists to look for cures as well as means of prevention. In addition to preparing vaccines, NIAID scientists and contractors are seeking substances that inhibit the ability of a virus to take over the cell's genetic processes. One antiviral substance that is under intensive investigation is interferon -- a natural body substance produced in response to virus invasion. New methods are being sought to stimulate, artificially, the body's ability to produce large amounts of interferon when it is needed. Polyinosinic polycytidylic acid (poly I.poly C) has been shown to be a good chemical inducer of interferon in laboratory animals. A few carefully controlled studies have been initiated to determine the usefulness of this inducer in man. Antiviral substances and their inducers are now under intensive study. New concepts in the treatment of viral and viral respiratory infections may well be formulated in the near future.

Scientists are also studying factors which affect susceptibility to colds. One NIAID research team, for example, has studied a popular belief concerning the cause of a cold. Using volunteer subjects, the scientists showed that chilling, exposure, or overheating apparently has little effect on the development or seriousness of a cold. If a rhinovirus or coronavirus infects the body, a cold usually develops, and the importance of other factors has not been demonstrated.

Pneumococcal Pneumonia

Although antibiotics -- such as penicillin and tetracycline -- cure bacterial pneumonia, the death rate from influenza and pneumonia continues to rise. This rise, in the face of reliable cures and proven treatment, has been attributed to the increasing number of elderly in the population, and to the fact that hospital admissions of the elderly since the advent of Medicare has permitted more accurate reporting of the causes of illness and death. In 1955, there were 28.5 million Americans over 55; today there are 37.7 million and it has been predicted that by 1980, the number will reach 46 million.

The elderly are not the only pneumonia victims. For many people the shock of a major infection is frequently fatal, even after antibiotics rid their bodies of bacteria.

In 1967 the Infectious Disease Branch of NIAID began conducting a program of surveillance studies to identify the types of bacterial pneumonia most prevalent and the population groups at highest risk. Presently, the program has expanded to include some 400,000 persons in the United States.

In 1968, on the basis of early findings, a contract was awarded to the Eli Lilly Company for production of vaccines to provide effective immunity against the most common types of pneumococcus -- a group of organisms known to cause pneumonia.

Small clinical trials of these vaccines have begun and will be expanded in 1971. As data from these tests accumulate, work will begin on the formulation of a single vaccine effective against more than one strain of the pneumococcus organism.

Armed with new epidemiologic data and sophisticated laboratory methods for developing vaccines, NIAID and cooperating contractors eventually hope to be able to prevent fatal pneumococcal pneumonia in susceptible population groups.

Mycoplasma Infections

Organisms comprising the *Mycoplasma* family are becoming of increasing concern to the scientific and medical communities as evidence accumulates implicating them as a cause of acute respiratory disease.

For many years these organisms, which share many biologic characteristics with both viruses and bacteria, were of greater concern to veterinarians than to those working on human medical problems. It was not until 1942 that Dr. Monroe D. Eaton grew in eggs an organism (first known as Eaton's agent) from a case of primary atypical pneumonia. In 1961, a group of NIH and other scientists demonstrated that this unknown agent was *Mycoplasma pneumoniae* and that it was an important cause of human disease.

Although there are an increasing number of human mycoplasma being isolated, *M. pneumoniae* seems to be the only strain which produces disease in man. It has been implicated in infections of the nose and throat, the bronchial tubes leading into the lung, and even the small alveoli found deep in the lung tissue. It has also been associated with skin rashes, with some cases of severe meningo-encephalitis, and with hemolytic anemia.

The illness caused by *M. pneumoniae* varies. Sometimes infection is symptom-free. Dr. Thomas Grayston, NIAID contractor at the University of Washington, discovered that more than 70% of family contacts he examined had clinically detectable pneumonia although they did not feel ill enough to seek medical care.

Although few *M. pneumoniae* infections are life-threatening and death rarely occurs, infections can be severe. Outbreaks in military and civilian populations have resulted in large numbers of hospitalized patients. Investigations, involving both humans and animals, have shown that certain broad antibiotics, such as tetracycline, significantly reduce the symptoms and shorten the duration of hospitalizations.

Other studies however, have indicated that the usefulness of these drugs in *preventing spread* of the disease is limited. For this reason, attempts have been underway to produce a safe and effective vaccine using either live or inactivated *M. pneumoniae* organisms.

An inactivated vaccine was produced in 1967 through the collaborative efforts of NIAID scientists, contractors, and grantees. However, this vaccine and the one produced shortly thereafter, when clinically tested, proved to be only partially effective in preventing illness.

Now a more promising vaccine against *M. pneumoniae* has been produced from a strain of organism isolated at Children's Hospital in Columbus, Ohio. Using a new technique worked out by NIAID contractor Dr. Norman Somerson and associates, scientists can now grow the fastidious organisms with relative ease on the walls of glass bottles in a medium using cow serum for nourishment. This has eliminated the necessity of growing the organism in horse serum which can cause potentially explosive allergic reactions in sensitive persons.

Preliminary evaluation data accumulated on vaccine developed by this technique appear quite promising. When tested in 45 volunteers in Texas, the vaccine produced antibodies in the blood of all the volunteers. The investigators must now determine whether these ordinarily protective substances will, in fact, be protective against the mycoplasma pathogen and for how long.

Many questions on the basic nature of the mysterious mycoplasma organism remain to be answered. For example, what role do mycoplasma play in chronic respiratory disease? What role might they play in birth defects, in neurological disorders, and in arthritis?

Other Respiratory Vaccines

Alongside traditional methods of vaccine preparation (the use of live-weakened or killed organisms) a promising new aspect of vaccine research is gaining momentum -- the development of temperature-sensitive (ts) mutant strains. Intrigued by the isolation of strains of RS (respiratory syncytial) virus, able to grow and reproduce only at low temperatures, scientists at the NIAID and elsewhere are now trying to isolate and produce temperature-sensitive mutants of rhinovirus, parainfluenza virus, and M. pneumoniae for use in immunizing preparations. Since the nose has a cooler temperature than the less-exposed respiratory tract areas, scientists reason that a mutant respiratory disease agent, incorporated into a vaccine and administered directly into the nasal tract, might increase immunity in this area and prevent disease. Such an agent would also not invade the lower respiratory tract which maintains a higher, less favorable temperature.

At Children's Hospital in the District of Columbia, a live attenuated strain of RS virus vaccine has been given to infants -- the traditional target of the RS virus. These children are now being watched carefully as they pass through seasonal epidemics of RS infection.

Ts mutants of other live virus strains are presently undergoing extensive testing in tissue culture and animals before being produced and evaluated in humans. Progress in the development of ts mutant strains of mycoplasmas is also being made.

With the steady improvement in research techniques yielding increased knowledge of the biology and ecologies of various respiratory pathogens, it is hoped that the Institute can continue to contribute to the solution of the many problems associated with respiratory illness in this country.

HEPATITIS

Dr. DAVIS. I did want to mention our work on heptatis which has been mentioned before and to tell you that our institute is conducting a very active program on the cause of hepatitis and the characteristics of the Australia antigen, a search for a cheap animal model which is necessary before we can really make any serious advances toward a preventive vaccine.

In fact, we are planning to double the amount of money that we are putting into heptatis in 1972. Last year, we spent about $700,000 and we are planning to put $1,500,000 into research on hepatitis next year.

Senator MAGNUSON. Is hepatitis a virus, an infection, or what?

Dr. DAVIS. It is called viral hepatitis.

Hepatitis, of course, may be just inflammation of the liver and many things can cause this. There are two kinds of infectious hepatitis. One, the transfusion hepatitis or serum hepatitis about which Dr. Murray spoke yesterday. Associated with this is a protein called the Australia antigen.

We are now studying this protein to determine just what its characteristics are. Some of its characteristics suggest that it is not a true virus, for instance it does not have nucleic acid.

The other kind of hepatitis is epidemic infectious hepatitis which one gets by water or food. That is a different kind of hepatitis from the kind that is transmitted by blood.

NUMBER OF VIRUSES

Senator MAGNUSON. Do you have any idea how many viruses there are?

Dr. DAVIS. We know that there are over 200 that affect man. There are more than that. There are over 100 which will cause respiratory infections in man.

Senator MAGNUSON. There are other kinds of viruses?

Dr. DAVIS. There are 200 which includes all the others.

Senator MAGNUSON. Like in the cancer field we are looking at, that would be another type.

Dr. DAVIS. Right.

ISOLATION OF VIRUSES

Senator MAGNUSON. Do you try to isolate a virus?

Dr. DAVIS. They can be isolated easily.

Senator MAGNUSON. And then find out what will work on it?

Dr. DAVIS. Yes.

Dr. MARSTON. As Dr. Baker said yesterday, we do not at present have a virus definitely isolated that causes a cancer in man.

Senator MAGNUSON. I understand. But you can isolate some viruses?

Dr. MARSTON. Yes, sir. We have isolated viruses from animals that definitely cause cancer in animals. Many of us expect that there will be a demonstration, probably within the next few years, of viruses as a definite cause of cancer. Part of the problem is that you can't inject those viruses into man to see if they cause cancer. So, it may take years to get indirect evidence. In an animal, if you think you have a virus that causes a cancer, you inject it into the animal and find out whether it does or not.

PREVENTIVE EFFORTS

Senator MAGNUSON. Then if it does, you proceed further to find out how to kill the virus?

Dr. MARSTON. Well, in animals there have been vaccines that have been produced which prevent the occurrence of that. There have been a number of substances that people have worked with in the lab that have been interesting.

A few years ago, you probably recall Dr. Davis talked about interferon and some of the materials that stimulate the production of interferon in animals will stop the growth of some types of cancer.

Senator MAGNUSON. Sort of a counteragent?

Dr. MARSTON. That is right.

When that was tried in man, then it did not work out as well as it had in animals.

COMMON COLD: RHINO VIRUSES

Senator MAGNUSON. I know there is all kinds of research on the common cold. You consider, generally speaking, a virus causes the common cold?

Dr. DAVIS. Yes. Many different kinds of viruses. There are a number of main groups of viruses which cause the common cold. One group, the most important, is called the rhino viruses. We know there are 89 different subtypes of those. This is the explanation of why we get so many colds. Apparently each time we get a different type.

That is all I have to present, Mr. Chairman.

VITAMIN C AS CURE FOR COLD

Senator MAGNUSON. What about the recent fad of vitamin C to stop the virus in common cold? Have you any research on that?

Dr. DAVIS. No. We are not supporting any research on that. We have not received any applications for study.

Senator MAGNUSON. There has been a lot of publicity on that.

Dr. MARSTON. Yes, sir. We have with the help of Dr. Davis' people reviewed studies that have been carried out in the past. Specifically, we have reviewed in detail one of the studies done in Great Britain a few years ago to see what evidence there is of the need for activity in this area.

In addition, we are doing a small study on NIH employees at the clinical center on the question of vitamin C and its relationship to colds. All of the evidence, as we have reviewed it to date, would lead us to believe that the people should not be advised to take vitamin C in anticipation that that will cure or prevent colds.

HEALTH REQUIREMENT OF VITAMIN C

Senator MAGNUSON. Vitamin C is good for you, anyway, isn't it? You doctors always tell us to drink a little orange juice every morning to get vitamin C.

Dr. MARSTON. Vitamin C is essential for people, and if you do not get vitamin C you get scurvy. There is no question that vitamin C is important. However, there is serious question whether man needs 3 or 4 grams of vitamin C a day which is what Dr. Pauling has said he believes.

POSSIBLE OVERUSE OF VITAMINS

Senator COTTON. This vitamin business is overdone to some extent, isn't it?

Dr. MARSTON. Possibly.

Senator COTTON. Are there dangers of too many vitamins?

Dr. MARSTON. Yes, sir; too large doses can cause harm.

Senator MAGNUSON. You suggest only one a day; is that right?

Dr. MARSTON. I don't think you will have trouble with one a day.

Senator MAGNUSON. I think the public, too, is concerned about, there are all kinds of therapeutic vitamins that have a little of everything in them. I don't mean the brand One-A-Day, but the doctor says take only one a day. But sometimes they will say go down and get a shot.

Now, is a shot more effective than the oral vitamin?

Dr. MARSTON. It depends again on the vitamin and the reason for taking it. Of course, there are diseases like pernicious anemia which require lifelong treatment with vitamin B–12 in order to prevent a serious illness.

But in general, if you leave out specific diseases, and I think most people would agree on the advisability of a good diet, and the further use of vitamins to supplement that diet when suggested by a physician.

Senator MAGNUSON. Suppose there is a case of general fatigue. I know when you have had a serious operation you are generally fatigued. It takes awhile to come back. Then they recommend shots.

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Mainly, they are B vitamin, aren't they, or generally the whole business?

Dr. MARSTON. Very often, when either one has not had an adequate diet because of sickness, or when one has had additional stresses on the body by an operation, for instance, then it is necessary to do something to build the body up again. This can be done with the use of vitamins, either orally or by shots.

Senator COTTON. Now, the department cut the agency estimate by nearly $3 million. The budget cut the department's estimate by another $2 million, roughly.

What programs are you pinching as a result of those reductions?

RESEARCH GRANT PROGRAM: EFFECT OF BUDGET REDUCTION

Dr. DAVIS. Well, the grant program, the research project grant program, is a program which will suffer most from the administration's budget.

We have the same situation that Dr. Marston described yesterday. In order to maintain the level of funding for committed funds, we don't have as many dollars to pay new grants and competing grants as we had formerly.

Senator COTTON. In all these areas?

Dr. DAVIS. In all these areas.

Senator COTTON. In other words, you spread the loss throughout the areas.

Dr. DAVIS. That is right.

It has not permitted us to have any expansion last year or this year at all in the direct areas or in the contract areas.

PROGRAM INCREASES AND REDUCTIONS

Senator COTTON. None of your areas have such important priorities in your mind that you preserve one area and place the cut on the rest?

Dr. DAVIS. There are some variations.

For instance, we are planning to put more money into hepatitis, but only $700,000. We are not going to spend quite as much money on our research on the common cold, or respiratory infections.

The allergic disease centers have a high priority.

We have reprogramed funds from some of the other programs on transplantation immunology and fellowships so that we can maintain those. We have had to reprogram money in order to carry on these things——

Senator COTTON. That is the story in every Institute.

Dr. MARSTON. Essentially, it is this year.

I think, though, again this is one of the Institutes that did not get a large increase in 1970. I think it got a little over a million dollar increase between 1970 and 1971. So, one has to look at these in an individual fashion.

DEPENDENCE OF CANCER ADVANCES UPON IMMUNOLOGY AND VIROLOGY RESEARCH

It is another Institute or I would almost say unique Institute in terms of its work in immunology and in virology being absolutely essential to development of further work in the cancer field.

Much of the excitement in cancer has arisen as a result of the work which has been done and supported over the years by this Institute in understanding viruses and infectious agents first and now as probable causes of human cancer. Its work is important in itself and it is also important because of the implementation that it has across the cancer field; in the Neurology Institute, the possible implication of viruses in neurological diseases and across the board.

INSTITUTES RECEIVING MINIMAL INCREASES PRIOR TO 1971

Senator COTTON. We can, of course, can and should check it, but you can name very readily at this point those Institutes that were more or less left out of the jump prior to 1971.

Dr. MARSTON. Yes, sir.

Senator COTTON. They are what?

Dr. MARSTON. I will run down this quickly, going from 1970 to 1971.

The Biological Standards had a very modest increase.

Arthritis went from $131 million to $134 million, which was essentially the same program level.

Neurology from $97 million to $99 million.

Allergy from $97 million to $98 million.

General medical sciences had an increase of roughly $6 million; almost all of which was in the genetics program, but without much in the other areas.

Environmental health sciences had a $2.7 million increase.

Senator COTTON. You are talking about prior to 1971.

Dr. MARSTON. These are increases between 1970 and 1971.

The research resources appropriation stayed about the same, in part, because last year it was in another part of the NIH organizationally and it did not participate in the same sort of budget review last year. Actually the program level went down from $66,900,000 to $66,400,000 between 1970 and 1971.

Then the Fogarty Center had a modest increase.

Those are the main organizations which were left out of the "jump," as you have described it.

Senator COTTON. What is the Institute that the Fogarty Research is parallel to?

Dr. MARSTON. This is the Fogarty Center for Advanced Studies. It is responsible for the NIH's international activities. Dr. Levitt will be speaking to this later today.

Mr. MILLER. Senator Cotton, international research is supported. I think, in all the institutes. The Fogarty Center is involved in some specific programs, and I believe, is a staff focal point for all other NIH international activities.

That is what Dr. Marston refers to.

TRAINING GRANTS

Senator MAGNUSON. All of us have been concerned with the advisability of increased training, more training grants. The health manpower thing is bothering everybody, I am sure, including the Institute.

Doctor, in your Institute, you have the same amount budgeted for training grants in fiscal 1972 as last year.

Does that mean a cutback in actual support or would it be just the same level?

Dr. DAVIS. We are not able to fund as many training grants this year as formerly.

Senator MAGNUSON. That is what I thought.

Put in the record how many approved and unfunded training grants you have. Now, in allergy we have that table we put in, but in your whole Institute.

Dr. DAVIS. In the allergy and infectious diseases?

Senator MAGNUSON. How many are unfunded because I only have allergy here where the unfunded was, it has been about the same. These are approved but unfunded. You need $13,724,000 to fund the ones that have been approved.

Dr. MARTSON. These are research grants. These are not training grants.

UNFUNDED TRAINING GRANTS

Senator MAGNUSON. Break down the training grants that have been unfunded. These are two different things.

(The information follows:)

YEAR END STATUS OF EXTRAMURAL PROGRAMS-Continued

TRAINING GRANTS

(Dollar amounts in thousands)

	1969		1970		1971 estimate		1972 estimate	
	Number	Amount	Number	Amount	Number	Amount	Number	Amount
Cancer:								
Funded..........	201	11,641	185	10,774	155	10,774	125	8,358
Unfunded........	3	153	19	3,839	41	5,309	46	5,980
Heart:								
Funded..........	386	18,815	360	16,577	370	17,643	359	13,592
Unfunded........	1	36	2	81	5	1,208	12	1,352
Dental:								
Funded..........	97	5,609	88	5,206	88	5,206	81	4,285
Unfunded...........................			4	407	10	869	7	325
Arthritis:								
Funded..........	302	16,109	288	15,072	264	15,072	249	11,475
Unfunded........	9	398	23	1,857	34	2,342	35	2,020
Neurology:								
Funded..........	545	19,504	445	14,299	365	14,300	351	11,456
Unfunded........	53	4,201	84	7,067	202	8,563	239	12,600
Allergy:								
Funded..........	173	9,488	151	8,452	152	8,822	157	7,280
Unfunded........	3	68	24	1,113	33	1,869	36	1,800
NIGMS:								
Funded..........	616	46,901	544	44,477	514	43,746	487	38,385
Unfunded........	77	3,678	125	9,999	104	12,346	106	12,554
NICHD:								
Funded..........	153	10,012	131	9,392	116	10,142	100	9,085
Unfunded........	23	1,280	57	4,831	78	5,955	90	7,000
NEI:								
Funded...........................			52	2,984	47	2,998	41	2,225
Unfunded.........................			10	1,153	5	1,023	9	1,907
NIEHS:								
Funded..........	45	3,652	41	3,525	42	3,103	34	2,843
Unfunded.........................			1	380	1	102	6	586
DRR:[1]								
Funded...........................			9	352	9	352	8	352
Unfunded.........................			3	429	11	318	11	300
Subtotal:								
Funded..........	2,518	141,731	2,294	131,110	2,122	132,158	1,992	109,336
Unfunded........	169	9,814	352	31,156	524	39,904	597	46,424
NLM:								
Funded..........	17	1,310	10	983	12	1,000	11	1,000
Unfunded........	2	89	6	333	3	183	6	380
BHM:								
Funded..........	878	27,734	678	21,659	690	23,970	698	24,906
Unfunded........	127	7,995	99	7,376	86	8,380	95	8,273
Total NIH:								
Funded..........	3,413	170,775	2,982	153,752	2,824	157,128	2,701	135,242
Unfunded........	298	17,898	457	38,865	613	48,467	698	55,077

---

[1] In FY 1969 DRR was included with BHM.

VENEREAL DISEASES

Senator MAGNUSON. Now tell us a little bit about what you are doing on venereal diseases.

Dr. DAVIS. Up until this year we have made no special effort in the study of venereal disease. We did receive a few applications for research. These were handled in the usual way and if they qualified they were paid.

But this year it became apparent that venereal disease is such an important national problem that we felt we must do something about this. So, we have initiated a very modest effort designed to learn more about the gonococcus, the bacterium causing gonorrhea. Actually, we know very little about this bacterium in terms of its biochemistry, its reaction in the host, much less than we know about most bacteria.

We felt that inasmuch as the methods of control now being used seem to be ineffective that our best contribution would be to learn more fundamentals about the organism and how it reacts in the body.

Senator MAGNUSON. It is hard for the institute to get involved in any movement of the prevention of venereal disease, actual tests or treatment?

Dr. DAVIS. That is right. This is all done by the Venereal Disease Division of CDC.

Senator MAGNUSON. If you find out about the bacteria, the other people in preventive medicine may be able to do more, the local people, the health agencies, or people of that kind.

Dr. DAVIS. That is right.

Senator COTTON. What is CDC?

Dr. DAVIS. Center for Disease Control in Atlanta.

We held a small meeting last May, which brought together people who would know about antigens and the biochemical process of various bacteria to try to get them interested in the gonococcus. Actually, we have awarded a very important grant to Rockefeller University recently to study specifically fundamental questions about the organism.

Senator MAGNUSON. Do most experts generally agree that what they have been using would seem to be ineffective on venereal diseases, gonorrhea, that it has developed an immunity to it?

Dr. DAVIS. There seems to be an increasing resistance to penicillin.

Senator MAGNUSON. Is that what they were using?

Dr. DAVIS. Yes. We don't know, for instance, whether there are several types of the organism as there are in pneumococcus. We don't have that information.

This is the kind of thing we need to know.

FUNDING ADEQUACY

Senator MAGNUSON. Do you have enough funds in here to really take a look at this? This is getting pretty serious, isn't it?

Dr. DAVIS. Yes.

Senator MAGNUSON. Throughout the Nation.

I have seen charts go up like this. I don't know whether you have charts. Of course, they are usually reports from the Public Health officials or from the local officials as to the rise in both syphilis and gonnorhea.

Dr. DAVIS. We had a very small program in all VD research in 1970—only $190,000.

The only funds we have in 1972 are in research grants.

Senator MAGNUSON. I will ask you again the same question.

In view of this startling spread in apparently the last 2 years or so—of course, a lot of this research can't help certain social conditions; there is nothing you can do about that—but you can help cure the diseases and I am wondering if you should not have a little bigger program than that.

Dr. DAVIS. There is a very great need for new work in this field.

Senator MAGNUSON. I have no further questions.

I do want those figures on training grants within your department.

Thank you very much, Doctor.

Dr. DAVIS. Thank you, Mr. Chairman.

Senator COTTON. Thank you for a very interesting statement.

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

To carry out, except as otherwise provided, title IV, part E *and section 1004 of title X* of the Public Health Service Act with respect to child health and human development, [$94,436,000] *$103,232,000.*

Explanation of Language Changes

The language has been amended to cite section 1004, Title X of the Public Health Service Act. Congress amended this title to provide additional funds for the support of family planning and population research in 1971, 1972, and 1973.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NATIONAL INSTITUTES OF HEALTH

National Institute of Child Health and Human Development

Amounts Available for Obligation

	1971	1972
Appropriation	$94,436,000	$103,232,000
Real transfer to:		
"Departmental Management"	-13,000	---
Real transfer from:		
"National Institute of Neurological Diseases and Stroke (Proposed transfer for increased pay costs)"	+62,000	
"National Institute of General Medical Sciences (Proposed transfer for increased pay costs)"	+262,000	---
Comparative transfers to:		
"Office of the Director"	-47,000	---
"Departmental Management"	-3,000	---
"Health Manpower"	-1,057,000	---
Comparative transfer from:		
"National Heart and Lung Institute"	+36,000	---
Total, obligations	93,676,000	103,232,000

Obligations by Activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase or Decrease Pos.	Increase or Decrease Amount
	Grants:						
95	Research..........	--	$50,223,000	--	$54,229,000	--	$4,006,000
	General research support grants...	--	(3,909,000)	--	(3,475,000)	--	(-434,000)
	Scientific evalutaion........	--	(100,000)	--	(100,000)	--	(-)
	Mental retardation research centers..........	--	(3,875,000)	--	(5,375,000)	--	(+1,500,000)
101	Fellowships........	--	3,786,000	--	3,653,000	--	-133,000
103	Training..........	--	9,085,000	--	9,085,000	--	--
	Direct Operations:						
105	Laboratory and clinical research.	265	9,254,000	281	11,517,000	+16	+2,263,000
107	Collaborative research and development.......	40	15,469,000	45	18,521,000	+5	+3,052,000
112	Biometry, epidemiology and field studies..........	24	2,200,000	24	2,227,000	--	+27,000
113	Training activities........	4	86,000	4	93,000	--	+7,000
114	Review and approval.........	92	2,544,000	92	2,808,000	--	+264,000
115	Program direction..	48	1,029,000	48	1,099,000	--	+70,000
	Total obligation..	473	93,676,000	494	103,232,000	+21	+9,556,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions..	473	494	+21
Full-time equivalent of all other positions.........................	39	38	-1
Average number of all employees......	474	503	+29
Personnel compensation:			
Permanent positions...............	$5,762,000	$ 6,619,000	+$857,000
Positions other than permanent.....	289,000	294,000	+5,000
Other personnel compensation.......	73,000	84,000	+11,000
Subtotal, personnel compensation	6,124,000	6,997,000	+873,000
Personnel benefits..................	654,000	704,000	+50,000
Travel and transportation of persons.	227,000	270,000	+43,000
Transportation of things............	56,000	63,000	+7,000
Rent, communications, and utilities..	188,000	204,000	+16,000
Printing and reproduction...........	140,000	166,000	+26,000
Other services:			
Project contracts.................	16,649,000	19,545,000	+2,896,000
Payment of NIH Management Fund.....	3,518,000	4,150,000	+632,000
Other.............................	1,204,000	1,466,000	+262,000
Supplies and materials..............	456,000	651,000	+195,000
Equipment...........................	1,366,000	2,049,000	+683,000
Grants, subsidies, & contributions...	63,094,000	66,967,000	+3,873,000
Total obligations by object.......	93,676,000	103,232,000	+9,556,000

Summary of Changes

1971 estimated obligations	$ 93,676,000
1972 estimated obligations	103,232,000
Net change	+9,556,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built in:				
1. Annualization of 1971 pay increase costs		---	---	342,000
2. Annualization of positions new in 1971		---	---	139,000
3. Within-grade pay increases		---	---	161,000
4. FTS rate increase		---	---	21,000
5. One additional day of pay		---	---	28,000
B. Program:				
1. Research grants		42,339,000	---	+7,600,000
2. Laboratory and clinical research		6,813,000	+16	+1,400,000
3. Collaborative research and development		15,352,000	+5	+3,000,000
C. Payment to "National Institutes of Health Management Fund" for centrally furnished services		3,518,000	---	+632,000
Total increases		---	+21	+13,323,000
Decreases:				
A. Program:				
1. Research grants		42,339,000	---	-3,594,000
2. Fellowships		3,786,000		-133,000
3. Laboratory and clinical research		6,813,000		-40,000
Total decreases		---	---	-3,767,000
Net change		---	+21	+9,556,000

Explanation of Changes

Built-in Increases -- These increases provide $342,000 for annualization of 1971 pay increase costs; $139,000 for annualization of positions new in 1971; $161,000 for within-grade increases; $28,000 for one additional day of pay in 1972; and, $21,000 for FTS rate increases.

Research Grants -- The increase of $7,600,000 will be used to expand the population and reproduction program by $6,100,000 and mental retardation research centers support by $1,500,000. Decreases of $3,594,000 will be made in the following programs: aging $1,341,000, child health $1,819,000, and General Research Support Grants $434,000.

Fellowships -- The decrease of $133,000 will fund 12 fewer fellowships in 1972

Laboratory and clinical research -- The increase of 16 positions and $1,400,000 will be used to expand the reproduction and population program by $1,000,000 and the child health program by $400,000. This increase is offset by a $40,000 decrease.

Collaborative research and development -- An increase of 5 positions and $3,000,000 will be used to expand the Institute's research contract program. The population and reproduction contract program will ~~be increased $2,500,000 and~~ the child health program $500,000.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action taken or to be taken
1971 House Report	
Mental retardation research	
1. Committee suggestion that mental retardation research be vigorously pursued.	1. The Institute increased the special line item in the appropriation for Mental Retardation Research Centers from $1,875,000 in 1970 to $3,875,000 in 1971 and has again increased its request to $5,375,000 in 1972.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act Section 301--Research and Investigation, in general.............................	Indefinite	$103,232,000
Title IV, Part E---National Institute of Child Health and Human Development.......	Indefinite	
Family Planning Services and Population Research Act of 1970, Section 1004--Research Grants and Contracts..........	$50,000,000	

The legislative authority which provides for the award of grants for research, research training, and fellowships is included in section 301 of the Public Health Service Act.

The Public Health Service Act, Title IV, National Research Institutes, Part E, Institutes of Child Health and Human Development and of General Medical Sciences--

"Sec.441. The Surgeon General is authorized, with the approval of the Secretary, to establish in the Public Health Service an institute for the conduct and support of research and training relating to maternal health, child health, and human development, including research and training in the special health problems and requirements of mothers and children and in the basic sciences relating to the processes of human growth and development, including prenatal development."

Sec.444. The Surgeon General shall, through an institute established under this part, carry out the purposes of section 301 with respect to the conduct and support of research which is the function of such institute... The Surgeon General is also authorized to provide training and instruction and establish and maintain traineeships and fellowships, in the institute established under section 441 and elsewhere in matters relating to diagnosis, prevention, and treatment of a disease or diseases or in other aspects of maternal health, child health, and human development, with such stipends and allowances (including travel and subsistence expenses) for trainees and fellows as he deems necessary, and, in addition, provide for such training, instructions, and traineeships and for such fellowships through grants to public or other nonprofit institutions."

The Family Planning Services and Population Research Act of 1970--

"Sec.1004. (a) In order to promote research in the biomedical, contraceptive development, behavioral, and program implementation fields related to family planning and population, the Secretary is authorized to make grants to public or nonprofit private entities and to enter into contracts with public or private entities and individuals for projects for research and research training in such fields."

"(b) For the purpose of making payments pursuant to grants and contracts under this section, there are authorized to be appropriated $30,000,000 for the fiscal year ending June 30, 1971; $50,000,000 for the fiscal year ending June 30, 1972; and $65,000,000 for the fiscal year ending June 30, 1973."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Departmental Management	-$ 13,000	To establish the Federal Engineering Construction Agency
Real transfer from:		
National Institute of Neurological Diseases and Stroke	+ 62,000	Proposed transfer for increased pay costs
National Institute of General Medical Sciences	+ 262,000	Proposed transfer for increased pay costs
Comparative transfers to:		
Office of the Director	- 14,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director
Departmental Management	- 3,000	Transfer of Mental Retardation functions to Office of the Secretary
Health Manpower	-1,057,000	Transfer of institutional support funds to Health Manpower
Comparative transfers from:		
National Heart and Lung Institute	+ 36,000	To provide an equitable distribution of the Management Fund in 1972.

National Institute of Child Health and Human Development

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1964	($34,000,000)	($34,000,000)	($34,000,000)	($34,000,000)
1965	43,169,000	43,696,000	42,696,000	42,696,000
1966	53,524,000	53,524,000	55,024,000	55,024,000
1967	61,448,000	61,422,000	64,922,000	64,922,000
1968	68,621,000	68,621,000	74,621,000	68,621,000
1969	75,394,000	70,859,000	76,359,000	73,126,500
1970	75,852,000	73,098,000	80,800,000	77,192,000
1971	93,303,000	94,436,000	94,436,000	94,436,000
1972	103,232,000			

Justification

National Institute of Child Health and Human Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	473	$6,778,000	494	$7,701,000	+21	+$923,000
Other expenses	--	86,898,000	--	95,531,000	--	+8,633,000
Total..................	473	93,676,000	494	103,232,000	+21	9,556,000

General Statement

The National Institute of Child Health and Human Development conducts and supports research and training dealing with human development from conception through old age. This approach, which cuts across disciplinary lines and spands both normal and abnormal development, provides the sound scientific basis for improvements in the health and well-being of the American people of all ages.

To achieve this mission, the Institute has identified primary areas for programmatic development, each corresponding to clusters of problems of both scientific and social importance and urgency. These include family planning and the attendant consequences of over-population, the healthy development of the unborn and newborn, the intellectual and physical development of the young, the prevention and amelioration of mental retardation, and the understanding of the aging process.

The request of $103,232,000 for 1972 represents a net increase of $9,556,000 over 1971. The net increase is comprised of a program increase of $12,037,000; built-in increases of $691,000; a management fund net increase of $632,000; offset by program decreases of $3,370,000; and a decrease of $434,000 in general research support grants. The program increase will be used in two areas: $9,600,000 in population and reproduction and $2,400,000 in child health which includes an increase of $1,500,000 for the mental retardation research centers.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Regular project......	$42,339,000	$45,279,000	+$2,940,000
Special program......	7,884,000	8,950,000	+ 1,066,000
Total research grants	$50,223,000	$54,229,000	+$4,006,000

Introduction:

This activity supports regular research grant projects in population and reproduction, perinatal biology and infant mortality, growth and development, adult development and aging, and mental retardation. In addition, funds are provided for general research support grants, scientific evaluation grants, and mental retardation research center grants.

The $4,006,000 net increase in 1972 will be used to expand research in population and reproduction and mental retardation. This net increase provides a $6,100,000 increase in the population and reproduction program, a $1,500,000 increase in the Mental Retardation Research Centers, which are offset by a $1,341,000 decrease in the adult development and aging program, a $1,819,000 decrease in child health programs and a $434,000 decrease in general research support grants.

Research Grants: The mission of the National Institute of Child Health and Human Development is to solve the mysteries of human development from conception to the end of life. To attain this goal, the Institute expends the greatest portion of its funds in the research grant activity. These funds are distributed nationwide to scientists doing research in the fields of population and reproduction, perinatal biology and infant mortality, growth and development, adult development and aging, and mental retardation. The regular research grants program is the primary means of achieving these research objectives. Additionally, the activity funds special research programs--Mental Retardation Research Center Grants, Scientific Evaluation Grants and General Research Support Grants.

Program Plans for 1971 and 1972:

The increase of $4,006,000 will be used to expand the Institute's programs of population and reproduction and child health with particular emphasis on the first five years of life. Coupled with these program increases will be reductions for the support of General Research Support Grants and the Adult Development and Aging Research Grant Program.

Population and Reproduction. Research grants in population research are used to complement the total programs of the Center for Population Research. The grants support investigations of biological, behavioral, and social processes of reproduction and its regulation in humans and animals. These investigations range from studies of reproductive control in human and experimental animals to the increase of knowledge of the sociology of population growth.

The biomedical research program includes investigations of the wide range of reproductive phenomena. The acquisition of deeper insights into these basic biological processes of reproduction will permit the development of new contraceptives which are compatible with health, are effective, and are generally acceptable. Reports of the adverse side effects of available oral contraceptives, and the unknown mechanism of action of intrauterine devices (IUD's) are evidence of the need for new contraceptives.

A number of priority areas have been identified for special emphasis: ovulation and gamete transport, luminal fluids of the reproductive systems, immunological aspects of the fertilization process, biology of the corpus luteum, releasing factors and gonadotropic hormones, population genetics, implantation, problems of infertility, and the biology of the male reproductive system. These are areas of investigation in biomedical research which are insufficiently supported and/or where the state of the art lacks sophistication.

Although primary stress is placed on biological problems in population research, behavioral research is also important to the understanding of reproduction, population dynamics, and family planning. Studies are needed on factors involved in beginning or discontinuing the use of contraceptives, and on the development of attitudes and decisions concerning child bearing and family spacing.

The nature and measurement of population change is receiving increased attention. The effects of population growth and increased social stress on animals are being studied by Institute grantees. The relationship of reproductive behavior to hormonal activity is also under investigation.

A portion of the increase in population research grants will be allotted to the Institute's new population research center grants which will provide core support to program initially direction in two to four institutions engaged in population research. This Population Research Centers Program provides an efficient means for consolidating the multidisciplinary effort necessary to understand and cope with the problems of population growth.

Child Health. Research on child health is carried out under the direction of three of the Institute's program areas: Perinatal Biology and Infant Mortality, Growth and Development, and Mental Retardation.

A major responsibility of this Institute is the stimulation and support of fundamental and clinical research aimed at the reduction of infant mortality, in particular, and at improving the health status of mothers and infants, in general. Such efforts will result in a vast improvement in the products of conception and thereby improve the quality of human life. To carry out its mission in this area, the Institute has developed a research program around the broad areas of 1) pregnancy and maternal health, 2) developmental biology, 3) fetal health and development, and 4) infant survival and well being.

The number of deaths occurring among infants before their first birthday is a major source of concern in the United States. During the first year of life, the risk, of dying is greater than at any other time until after the age of 65. The infant mortality rate in this country, which ranks thirteenth among the developed countries of the world, was 21.7 per 1,000 live births for 1968, and 20.7 per 1,000 live births in 1969. The latest firm figures for Sweden, the nation with the lowest incidence of infant mortality, show a mortality rate of 12.9 per 1,000 live births in 1967.

Growth and development research is concerned with the period of development extending from birth to adulthood. Special emphasis will be given in 1972 to studies of health and development of children under age 6, including the effects of nutrition on physical and mental development. In addition, more knowledge will be sought bearing on developmental changes at puberty and in the adolescent period. Research on the behavioral aspects of human development will seek a more complete understanding of the processes involved in learning and cognitive development...to learn how to describe and measure them. Support will be given to studies of various aspects of human growth and development, on the interactions of individuals and their environments, and on the theoretical foundations of behavioral measurement.

Special attention will continue to be devoted to studies of the mechanisms by which malnutrition causes irreversible damage to cells, tissues, and organs, thereby limiting the achievement of inherited potential. Such information will facilitate development of improved methods of early diagnosis and more successful therapy for patients.

Greater efforts will be exerted to distinguish the periods in life most sensitive to nutritional deprivation and the extent to which malnutrition interacts with psychosocial deprivation to impede optimal growth and development. Fundamental to this aim is the need to define minimal nutritional requirements necessary to maintain normal growth and resistance to disease. Special attention will be given to the neuroendocrine control of growth and its relation to varying levels of nutrition.

Increased support will be given to studies designed to determine the critical periods in biological and behavioral development, when basic structure or patterns are established and after which rehabilitation may be impossible or less effective. The focus throughout the program will be upon identification of those periods when maximal impact from intervention programs might be obtained.

Too little is known about how the infant develops mechanisms for resisting disease and recurrent infections. It is necessary to study the individual components of these defense systems, as well as the interdependent immunologic mechanisms taken together as a single working entity. Support will be provided for studies in developmental immunology (both prenatal and postnatal) dealing with early detection of subclinical disease in neonates, as well as methods of properly treating and preventing such diseases.

In studying the complexity of human development from the behavioral standpoint, research on maximizing the capacity of the individual to learn will receive primary emphasis. Activities will be directed toward a variety of studies on infant behavior, including research on attention, discrimination, and perception in children under one year of age. This research will lead to a better understanding of learning and development throughout childhood. Much of the anticipated work bearing on learning will examine the ways the young child interacts with his environment, particularly in the crucial preschool years.

The Institute is the focal point within the NIH for research in Mental Retardation. One of its major areas of emphasis is directed to the research activities in the 12 mental retardation research centers.

Implementation of this authority resulted in construction grant awards for 12 research centers to institutions for research and training in 11 different states. Four of the centers are completed and became operational in 1968; two began operations in 1969, three in 1970, and two will begin operations in 1971, with the twelfth to open early in FY 1973.

	Mental Retardation Research Centers	Fiscal Year Completed
1)	University of Chicago Chicago, Illinois	1967
2)	Children's Hospital Cincinnati, Ohio	1968
3)	George Peabody College for Teachers Nashville, Tennessee	1968
4)	University of Colorado Medical Center Denver, Colorado	1968
5)	University of Washington Seattle, Washington	1969
6)	University of California at Los Angeles Los Angeles, California	1969
7)	Albert Einstein College of Medicine Yeshiva University, New York, New York	1970
8)	University of Kansas Lawrence, Kansas	1970
9)	Walter E. Fernald State School Waltham, Massachusetts	1970
10)	Children's Hospital Medical Center Boston, Massachusetts	1971
11)	University of North Carolina Chapel Hill, North Carolina	1971
12)	University of Wisconsin Madison, Wisconsin	1973

Through the support of these mental retardation research centers and also the support of individual investigators through the project grant mechanism the Institute is seeking ways to prevent, manage, diagnose, and ameliorate the ravages of mental retardation. In this regard the Mental Retardation Program has identified a number of areas of special interest.

Longitudinal studies will be supported to determine the long-range consequences of aberrations of pregnancy, delivery, and the neonatal period on intellectual and physical development of the child. Additional research is vitally needed to explore early care and training of these infants for the purpose of overcoming adverse conditions which, in large measure, shape the child's early development.

Prenatal diagnosis offers new hope for the prevention of mental retardation. Significant steps have been made in this direction through development of the technique of amniocentesis which provides diagnostic access to the fetus. A sample of the fluid surrounding the fetus is withdrawn from the amniotic sac and analyzed for abnormalities. By conducting chromosomal and biochemical studies on cells obtained by this procedure, it is now possible to predict whether a fetus as young as 12 weeks will be born with a variety of disorders. The availability of such information can provide a means for determining possible courses of action. More research is needed in order to identify other disorders that can be diagnosed prenatally, to develop techniques to permit earlier detection, and finally to devise methods of treating the fetus.

In low birth weight babies, the relationships between the socio-environmental stress, malnutrition and mental retardation need elucidation. In order more effectively to prevent mental retardation resulting from social and environmental stress, further specification is needed regarding the factors constituting stress, genetic components of learning, child-parent interaction patterns, and the interrelationship of biological preocesses and social forces in development.

Adult Development and Aging

Ten percent of the U.S. population is older than 65 years, and 80 percent of those over 65 have one or more serious diseases. Two-thirds of the Federal money spent on health care in this country is spent on persons over 65. One million persons over 65 live in institutions. The health problems of the older person in this country are of major importance and contribute greatly to the drain on available health resources. The human suffering involved is immeasurable.

Environmental and genetic factors are important in the disease of older persons, but major factors in the origin of those diseases are aging processes themselves.

The Institute will continue to support research on aging by scientists at universities, hospitals, and research institutions and in such areas as the biological, medical, behavioral and social-psychological aspects of aging including the study of progressive changes in cells, tissues, organ systems and the individual.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting projects.........	530	$30,864,000	550	$30,864,000	+20	(-)
2. Competing projects	202	11,475,000	210	14,415,000	+8	+$2,940,000
3. Subtotal regular program..........	732	42,339,000	760	45,279,000	+28	+2,940,000
4. General research support.........		3,909,000		3,475,000		-434,000
5. Scientific evaluation.......		100,000		100,000		(-)
6. Mental retardation research centers.		3,875,000		5,375,000		+1,500,000
7. Total res. grants.	732	50,223,000	760	54,229,000	+28	+4,006,000

Research Grants Program Analysis

1. Population & Reproduction Research.........	$10,364,000	$16,464,000	+6,100,000
2. Perinatal Biology & Infant Mortality........	10,059,000	9,413,000	-646,000
3. Growth and Development......	12,642,000	11,834,000	-808,000
4. Adult Development & Aging.........	3,592,000	2,251,000	-1,341,000
5. Mental Retardation	5,682,000	5,317,000	-365,000
6. Subtotal regular program.........	42,339,000	45,279,000	+2,940,000
7. General research support.........	3,909,000	3,475,000	-434,000
8. Scientific evaluation.......	100,000	100,000	(-)
9. Mental retardation research centers.	3,875,000	5,375,000	+1,500,000
10. Total research grants..........	50,223,000	54,229,000	+4,006,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Fellowships	$3,786,000	$3,653,000	-$133,000

The primary objective of the Institute's fellowship program is to increase the number of needed scientists qualified to carry on independent research in child health and human development.

This objective is carried out through four means: (1) postdoctoral fellowships are awarded to encourage and attract young investigators into obtaining research training and experience so that the country's research potential in a wide variety of disciplines can be maintained; (2) special fellowships are awarded to more advanced investigators, often faculty members on sabbatical leave, who find it highly productive to spend a year or two in research laboratories other than their own in which they can improve current skills or acquire new ones; (3) the highly successful research career development program provides support for younger investigators of demonstrated ability and provides the means whereby the grantee institutions can expand their potential; (4) the research career award provides stable support for the senior investigator.

Funds requested for 1972 will provide for 173 awards, compared to 185 in 1971, a decrease of 12.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting.....	125	$2,680,000	120	$2,600,000	-5	-$80,000
b. Competing........	8	190,000	12	300,000	+4	+110,000
2. Supplementals......	(2)	4,000	(2)	4,000	(-)	(-)
3. New................	58	912,000	41	749,000	-17	-163,000
4. Total fellowships..	191	3,786,000	173	3,653,000	-18	-133,000

Fellowships (By type of program)

	1971 No.	1971 Amount	1972 No.	1972 Amount	Increase or Decrease No.	Increase or Decrease Amount
1. Postdoctoral.......	42	$379,000	35	$320,000	-7	-$59,000
2. Special............	33	372,000	30	350,000	-3	-22,000
3. Research Career:						
a. Career...........	7	215,000	7	215,000	(-)	(-)
b. Development awards..........	109	2,820,000	101	2,768,000	-8	-52,000
4. Total fellowships..	191	3,786,000	173	3,653,000	-18	-133,000

Fellowships Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
1. Population & Reproduction..........	764,000	764,000	(-)
2. Perinatal Biology & Infant Mortality....	1,021,000	977,000	-$44,000
3. Growth & Development...	1,390,000	1,329,000	-61,000
4. Adult Development & Aging...............	263,000	251,000	-12,000
5. Mental Retardation.....	348,000	332,000	-16,000
6. Total fellowships......	3,786,000	3,653,000	-133,000

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Training Grants....	$9,085,000	$9,085,000	---

The training grant programs of the Institute are designed to (1) attract individuals to careers of interest to child health and human development; and (2) produce investigators who will contribute significantly to the mission of the Institute. In order to achieve these goals, the Institute supports training programs in population and reproduction, perinatal biology and infant mortality, growth and development, aging, and mental retardation. The goal of this training support is to produce research investigators capable of increasing knowledge of human development, not only in terms of physical form and function, but also in terms of mental, emotional, intellectual, and social development.

Training grants are available to institutions which can provide excellent programs for both predoctoral and postdoctoral trainees. These programs prepare both laboratory and clinical scientists for careers in areas of interest to child health and human development. Some of the grants provide clinical research training which prepares physicians who are not only skilled clinicians, but also scientists, able to evaluate research data critically, translate the results of research for patient care and keep abreast of their field.

Funds requested for 1972 will provide for 100 awards, compared to 116 in 1971, a decrease of 16.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting	92	$6,610,000	85	$7,614,000	-7	+$1,004,000
b. Competing	14	1,453,000	9	801,000	-5	-652,000
2. Supplementals	(2)	16,000	(4)	40,000	(+2)	+24,000
3. New.................	10	906,000	6	530,000	-4	-376,000
4. Scientific evaluation.........	(1)	100,000	(1)	100,000	(-)	(-)
5. Total training grants............	116	9,085,000	100	9,085,000	-16	(-)

Training Grants (By type of program)

	1971 No.	1971 Amount	1972 No.	1972 Amount	Increase or Decrease No.	Increase or Decrease Amount
1. Graduate	116	8,985,000	100	8,985,000	-6	(-)
2. Scientific evaluation........	(1)	100,000	(1)	100,000	(-)	(-)
3. Total training .... grants............	116	9,085,000	100	9,085,000	-6	(-)

Training Grants (Program Analysis)

	1971 Amount	1972 Amount	Increase or Decrease Amount
1. Population & Reproduction........	1,871,000	1,871,000	(-)
2. Perinatal Biology & Infant Mortality..	1,681,000	1,681,000	(-)
3. Growth & Development.	2,426,000	2,426,000	(-)
4. Adult Development & Aging............	2,008,000	2,008,000	(-)
5. Mental Retardation...	1,099,000	1,099,000	(-)
6. Total training grants	9,085,000	9,085,000	(-)

Direct Operations

Laboratory and Clinical Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	265	$3,644,000	281	$4,165,000	+16	+$521,000
Other expenses........	--	5,610,000	--	7,352,000	--	+1,742,000
Total.................	265	9,254,000	281	11,517,000	+16	+2,263,000

Introduction: Ten laboratories and branches conduct the Intramural Research operations in the program areas of the Institute. These include Developmental Biology Branch, Social and Behavioral Sciences Branch, Reproduction Research Branch, Laboratory of Biomedical Sciences, Behavioral Biology Branch, Children's Diagnostic and Study Branch, and the Gerontology Research Center (Baltimore), composed of the Laboratory of Molecular Aging, Laboratory of Behavioral Sciences, Laboratory of Cellular and Comparative Physiology, and Clinical Physiology Branch.

The net increase of $2,263,000 is made up of a program increase of $1,400,000, mandatory increases of $347,000, NIH Management Fund increase of $556,000 and a program decrease of $40,000.

Program Plans for 1971 and 1972: The Intramural Research Program has a program increase of $1,400,000. The Institute's Population and Reproduction program will use 12 positions and $1,000,000 and the Child Health program 4 positions and $400,000.

Population and Reproduction: The Institute is committed to a rapid expansion of and increased support for programs in reproductive biology. In its own laboratories, NICHD has assembled an intramural staff of scientists expert in many fields, to collaborate on research in reproductive biology. Staff, space, and breadth of studies have increased substantially during the past year which has facilitated the fundamental scientific work on which practical solutions to population problems will be based.

The Reproduction Research Branch of NICHD is involved in six major areas of study: the mechanism of action of hormones; the physiology of the menstrual cycle and female infertility; male reproductive biology, including fertility problems; the endocrinology of pregnancy; protein hormone isolation and characterization; and metabolism of the sex steroids.

These studies have various applications. An infertility clinic has been established in conjunction with some of these studies, and a new cause of female infertility has been identified. During 1972 additional patients will be accepted for treatment. Research on early pregnancy will continue to add to our knowledge about the causes of early abortion (miscarriage). Work on male and female reproductive biology and on protein hormones may aid in one development of new contraceptive methods and improvement in present methods, including rhythm.

The Pregnancy Research Branch will conduct research in the physiology of pregnancy, the effects of disease states on pregnancy, and identification of those factors which increase perinatal and maternal morbidity and mortality, using animal and clinical resources. Research will be focused on the development of methods for evaluating fetal growth, amniokenetics, placental function and uterine competence in both qualitative and quantitative terms. It will also identify and define diagnostic and therapeutic aids that will enhance the health of the mother, her fetus and the newborn infant, and to advance the scientific knowledge of the process involved in gestation and delivery.

Studies on the sex steroids have led to data on hypertension in oral contraceptive users; a planned cooperative study with the NICHD's Center for Population Research will look for characteristics of women who can be expected to develop hypertension while using the oral contraceptives. This study could lead to more effective screening of prospective users.

Child Health: This program is concerned with the early development of the child. A program evaluating the effectiveness of pre-school stimulation in various environments so as to develop the most effective way of preparing children from deprived environments for adaptation to school situations will be continued in FY 1972.

The biology and molecular elements of learning and memory will receive increased emphasis. The present program which uses animal models will be expanded in an attempt to identify the biochemical, electrochemical and physiological consequences of social deprivation.

The developmental immunology activity will conduct basic and clinical research into the nature of inducing molecules and biologic mechanisms of development of immunity during intrauterine, neonatal periods, and infancy utilizing the disciplines of immunochemistry, cellular physiology and biochemistry.

Adult Development and Aging: It is increasingly clear that lifetime nutritional experience influences aging biochemical events during the declining years of life. Animal models indicate that longevity can be favorably modified in a variety of animal species through dietary manipulations. In experimental animals, dietary changes can modify longevity and the period of reproductivity both adversely and favorable.

Attempts to relate gene structure to cell function is a most promising area of scientific investigation and will open new avenues for the study of mental retardation. Gene expression is obviously related to intellectual performance; the majority of patients with genic abnormalities suffer significant demonstrable intellectual deficiencies.

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	40	$ 633,000	45	$ 759,000	+5	+$ 126,000
Other expenses........	--	14,836,000	--	17,762,000	--	+ 2,926,000
Total..............	40	15,469,000	45	18,521,000	+5	+3,052,000

Introduction:

This activity provides the Institute an effective instrument for the direction of research which has been designated as high priority.

The majority of funds administered through this activity are assigned to the Center for Population Research. This Center was officially designated by the Department in August 1968 to carry our the population research objectives directed by the President's Health Message to the Congress on March 4, 1968. On December 24, 1970 the President signed into Law the Family Planning Services and Population Research Act of 1970 which called for increased Federal effort in both research and services aimed at this problem.

A program increase of $2,500,000 will support the Institute's contract program in population research. These funds will be used to stimulate research on contraceptive development, the evaluation of the medical effects of contraceptives in use, and social and demographic studies. The five new positions requested will provide additional technical and clerical support to administer the Center programs.

The collaborative contract program for childhood development will increase by $500,000 for new projects in nutrition and early childhood development.

Program Plans for 1971 and 1972:

Center for Population Research

There are a variety of reasons for giving special and urgent attention to research to help modify population changes in our own country and throughout the world. The effects of these changes are pervasive and threaten levels of health and nutrition, the prevalence of poverty, the rate of economic development and many other related social problems.

Every year the world's population increases by 70 million people. Every three years, the world accommodates an additional 200 million persons--the current Unites States population. The food supply, natural resources, and social and economic institutions cannot be strained to limitless bounds: eventually our growth rate must approach zero. How and when this should occur are vital research issues.

Institute supported studies have shown that in the U.S. an estimated one out of five million women have neither adequate information about nor access to family planning. The Federal Government's policy is that every child should be a wanted child and that every couple has the right to information and services necessary for planning their families. Achieving this policy requires that information, services, and more nearly perfect means of contraception than presently exist be available to all.

We must know more about the consequences of population growth and distribution, more about the determinants of family size, and more about reproductive processes--so that the technology to limit family size will be available to every individual.

Contraceptive Development

The ideal contraceptive would be effective, safe, inexpensive, reversible, self-administered, and acceptable to various population groups. No existing method fits all these criteria. Probably no single method will be universally satisfactory; the goal of contraceptive development is to develop many contraceptives, suitable to many kinds of people.

To rapidly develop a variety of new contraceptives, new approaches are underway in the following areas:

....development of new chemical compounds to achieve contraception in both sexes having safe dose formulations and without serious side effects

....development of methods which will allow for uninterrupted administration and constant release of potential contraceptive drugs

....development of chemical agents for control of the menstrual cycle

....development of new techniques for reversible female and male sterilization using mechanical devices

Until FY 1971, the contraceptive development program consisted primarily of directed fundamental research on topics considered relevant to the eventual development of new contraceptives. In fiscal year 1971, the Center will negotiate approximately 120 contracts for such research.

During FY 1971 and 1972 the contraceptive development program will begin concentrating on new or approved practical approaches and by 1973 it will include many phases of drug development, from synthesis through clinical testing, necessarily involving close cooperation with the pharmaceutical industry. The Institute's goal is the development of several new methods of fertility regulation before the end of this decade.

Medical Effects of Existing Contraceptives

This program involves research on the noncontraceptive effects of existing contraceptives and in 1972 it will also include research on the effects of other fertility regulating methods. A new Branch, the Fertility Regulating Methods Evaluation Branch was recently established in the Center for Population Research to direct this activity.

Evaluation of the oral contraceptives began in 1965 and remains the major area of interest. Beginning in 1972 and into the following four years, studies of the metabolism of steroid contraceptives--a remarkably neglected area--will be undertaken. The evaluation program will also emphasize investigations of the pharmacological properties of various estrogen-progestogen combinations in varying doses, with the aim of improving the clinical safety and efficacy of these widely used drugs. Research will explore doses, unique properties , and effects of oral contraceptive components, to determine whether equally effective or safer formulations can ben proposed. A secondary goal is to study the side effects of presently available formulations with as much precision as possible.

Methodology for doing this has improved greatly since the oral contraceptives were introduced 10 years ago.

Specific problem areas to be investigated include thromboembolism; cancer, carbohydrate and lipid metabolism; hypertension; general metabolic effects; behavioral effects; and fertility and outcome of pregnancy in former oral contraceptive users. Some effects are better understood than others, as a result of earlier studies.

Social Science Research

Population size, structure, distribution, and rate of growth are components of many current social problems. The knowledge necessary to assess how population is related to these problems, however, is incomplete. Problems of the individual also need clarification; for individuals to plan their families rationally, they need information based on research. For example, what effect does spacing children have on their growth and development? How effective has contraception been for its users? Finally, research attention must be focused on another major area; determination of the many diverse factors that influence popuation trends.

The Center's formal social science program began in fiscal year 1969 by concentrating on the continued measurement and analysis of fertility trends and differentials in the United States, the most important single contract being the support of another National Fertility Study in 1970. Other projects are design designed to study the determinants of fertility in a variety of cultural and sub-cultural settings, including ethnic sub-groups in the Unites States and certain foreign countries. Specific examples of social science studies include the incidence of induced abortion; the relationships between family planning and the status of women; social and economic determinants of age at marriage and family size; trends in marital disruption, remarriage, and fertility in remarriage; attitudinal factors affecting family size; analysis of social-economic factors associated with the decline in the birth rate in western Europe and in some of the less developed countries; methods of measuring unwanted child-bearing; the effects on fertilty of the transition from subsistence agriculture to a market-oriented agriculture; the social and psychological correlates and consequences of illegitimacy; the relationship between birth spacing and social mobility; the relationship between kin network and size of family; and the relationship of family size to social alienation in urban areas.

Research in the social sciences is being expanded as rapidly as possible to include studies of the ecological, economic and psychological consequences of population growth and distribution.

Child Health Programs

The interest of this Institue in child health begins at the moment of fertilization and continues through the developing years. This interest include the health of the mother and how her health effects fetus and infant. Special research opportunities and needs include studies on the early detection of abnormalities in utero, respiratory distress in the newborn, permaturity and the sudden infant death syndrome. Once the child has survived the hazards of intrauterine life the birth process, and adjustment to the new environment, the Institute's areas of interest shift toward study of factors affecting the kind of person the infant will become. These studies include research on both animals and humans and include nutritional, social, psychological and other environmental events. The Collaborative contract program is especially suited to research in the areas of nutrition and early childhood development.

Nutrition

Although evidence continues to accumulate concerning the possible effect of severe malnutrition (protein-calorie malnutrition) on the development of the central nervous system and intellectual ability, little information is available concerning the possible effects of the types of under-nutrition more frequently reported in the U.S. (as indicated by anemia, retarded growth, or low levels of nutrients in the blood). Limited studies in this area were initiated in FY 1971, and additional work is needed to determine the consequences of the latter types of malnutrition on intellectual development. The specific goal is to ascertain whether the effects can be reversed by appropriate rehabilitation, by special food programs, or by special educational procedures.

Greater effort will be directed to determining whether periodic undernutrition influences the receptivity of the preschool and school age child learning experiences. Of special importance here will be studies of emotionality, motivation, and ability to pay attention or to concentrate in preschool or school situations.

The psychological and attitudinal factors bearing on food selection and use are poorly understood and need investigation. Studies also will be supported seeking to determine the extent to which recurrent infection or illness precipitates malnutrition under marginal food intake levels.

Studies will continue to focus on the effect of malnutrition on fetal development and on the problem of prematurity. These studies will include the effect of nutritional supplements on both tne mother and child.

Currently utilized techniques for the assessment of nutritional status have a variety of shortcomings. Support will be given to studies and discussion workshops to explore and develop new methods for nutritional assessment.

Early Childhood Development

With expanding insight into cognitive development of the infant, the need for cross-cultural test procedures, and the strong interest in the effect of early environment on later development, improved standardized tests are needed. The Institute will support the collaborative research needed to improve tests and testing procedures for clinical diagnosis and child development research.

Many aspects of child development cannot be adequately pursued in human populations. Subhuman primates offer a variety of models for such studies. A specially designed primate breeding facility will be established to provide developmental researchers with high quality animals not currently available for specific studies.

Methods are not presently available for measuring the impact of social factors such as urbanization on the acquisition of social behavior patterns in children. We will support the development of suitable methodologies for such studies.

The physical and social environment also affects physiological development. Animal studies will be initiated to determine the impact of crowding, noise, and other environmental factors on physiological, physical and neurological development.

Past efforts have been directed toward coordinating data storage and analysis systems for the several major longitudinal studies of growth which we currently support. Efforts now underway support collaborative analyses of these data which we currently support. Efforts now underway support collaborative analyses of these data which we expect will yield new insights into factors affecting optimal child development. Close coordination of these studies with several concurrent efforts on minority populations in the U.S. and other populations in Latin American countries will be undertaken to determine variations in growth and development between ethnic groups.

Mental Retardation

Mental retardation today afflicts the lives of an estimated 6,000,000 persons in the Unites States. Its impact is directly felt by the some 20,000,000 family members who share the burden and problems of care of the retarded whose inadequate intellectual development impairs their ability to learn and to adapt to the demands of society. The causes of mental retardation are multiple and involve both physical and environmental factors operating singly or in subtle interactions.

Contracts for work on a cytogenetic registry, a study of variations in human chromosome preparation and the preparation of an animal model for mental retardation studies will be supported in 1971.

New studies in 1972 will explore how handling practices influence the course of intellectual and physical development in infants who suffered damage in utero, during birth, and in early postnatal life.

Biometry, Epidemiology and Field Studies

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	24	$331,000	34	$355,000	--	+24,000
Other expenses.........	--	1,869,000	--	1,872,000	--	+3,000
Total................	24	2,200,000	24	2,227,000	--	+27,000

The Institute's scientific staff plans investigations and conducts research in epidemiologic and biometric theory, techniques and methods. They also collect and analyze program statistics for Institute programs and execute statistical studies for use in program planning, development and evaluation.

Program Plans for 1971 and 1972:

This activity will be supported at the same level in 1972 as in 1971. The increase of $27,000 is for mandatory increases only.

Training Activites

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	4	$62,000	4	$67,000	--	+$5,000
Other expenses........	--	24,000	--	26,000	--	+2,000
Total.............	4	86,000	4	93,000	--	+7,000

This direct training program is designed to meet the needs of the Institute by providing supplementary or cross-disciplinary training for the scientific staff.

Program Plans for 1971 and 1972:

This activity will be supported at the same level in 1972 as in 1971. The increase of $7,000 is for mandatory increases only.

Review and Approval

	1971 Estimate		1972 Estimate		Incresase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	92	$1,317,000	92	$1,529,000	--	+$212,000
Other expenses........	--	1,227,000	--	1,279,000	--	52,000
Total.............	92	2,544,000	92	2,808,000	--	+264,000

This activity supports the personnel responsible for the administration of the Institute's several grant and contract programs. The services they provide include planning and developing programs for research grants, training grants, fellowships, and contracts which will best achieve the goals of the Institute; securing review and evaluation of all contract proposals prior to Institute funding, and also preparing grant applications for presentation to the National Institute of Child Health and Human Development Advisory Council; staff assistance to the Council; liaison with applicants, grantees, contractors, other components of the National Institutes of Health, advisory bodies, and interested organizations; continued evaluation of scientific activities and progress of the research and training grant programs and the contract programs; and the recording and reporting of fiscal and scientific information relevant to all grant and contract transactions.

Program Planns for 1971 and 1972:

This activity will be supported at the same level in 1972 as in 1971. The increase of $264,000 is for mandatory increases only.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	48	$791,000	48	$851,000	--	+$60,000
Other expenses.......	--	238,000	--	248,000	--	+10,000
Total............	48	1,029,000	48	1,099,000	--	+70,000

The personnel supported by this activity are responsible for the general administration, direction, and coordination of Institute programs. They also review the programs and propose and plan new operations for the Institute.

Program Plans for 1971 and 1972:

This activity will be supported at the same level in 1972 as in 1971. The increase of $70,000 is for mandatory increases only.

Program Purpose and Accomplishments

Activity: Research Grants (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$50,223,000	Indefinite	--	$54,229,000

Purpose: Provide support of research relating to maternal health, child health, and human development, including research in the special health problems and requirements of mothers and children and in the basic sciences relating to the processes of human growth and development, including prenatal development.

Explanation: Research grants supported under this activity range from single objective projects to broadly-based, multidisciplinary projects involving the collaboration of a number of scientists. In addition to the regular research grants and program project awards, support is furnished for special mental retardation research centers, and general research support grants.

Accomplishments in 1971: In 1971, 732 projects will be supported in the regular program and 9 projects will be supported in the Mental Retardation Research Centers. Three Mental Retardation Research Centers will be funded from the regular research grants program.

Objectives for 1972: In 1972, 760 projects will be supported in the regular program in addition to continuing support for the special research grant programs. Basic core support at the 12 Mental Retardation Research Centers will be expanded. The basic research program will be maintained close to its 1971 level while increasing support in the selected areas of population and reproduction, and portions of the child health program including research on aspects of nutrition and mental retardation.

Activity: Fellowships (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$3,786,000	Indefinite	--	$3,653,000

Purpose: The primary objective of the fellowships program is to increase the number of scientists qualified to carry on independent research in child health and human development.

Explanation: The above objective is carried out through four means: 1) postdoctoral fellowships are awarded in a wide variety of disciplines to encourage young scientists to obtain research training; 2) special fellowships are awarded to more mature individuals, often faculty members on sabbatical leave, who find it hightly productive to spend a year or two in research laboratories other than their own in which they can improve current skills or acquire new ones; 3) the highly successful research career development program supports the younger investigator of demonstrated ability and provides the means whereby the grantee institutions can expand their potential; 4) the research career award provides stable support for the senior investigator.

Accomplishments in 1971: In 1971 there will be an estimated 191 fellowships funded in the Institute's five program areas: Population and Reproduction, Perinatal Biology and Infant Mortality, Growth and Development, Adult Development and Aging, and Mental Retardation. Approximately 125 noncompeting continuations and 66 competing fellowships will be funded.

Objectives in 1972: In 1972 there will be a decrease of 12 fellowships and $133,000 in this activity.

Activity: Training Grants (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$9,085,000	Indefinite	--	$9,085,000

Purpose: The training grant programs of the Institute are designed to: 1) attract individuals to careers in the field of child health and human development; and 2) produce investigators who will contribute significantly to the mission of the Institute.

Explanation: The goal of the training grants is to produce research investigators capable of increasing knowledge of human development not only in terms of physical form and function, but also in terms of mental, emotional, intellectual and social development.

Training grants are available to institutions which can provide excellent training programs for both predoctoral and postdoctoral trainees. These programs prepare both laboratory and clinical scientists for careers in the area of child health and human development.

Accomplishments in 1971: In 1971 an estimated 116 graduate training grants will be funded in the Institute's five program areas: Population and Reproduction, Perinatal Biology and Infant Mortality, Growth and Development, Adult Development and Aging, and Mental Retardation. Approximately 10 new grants and 106 noncompeting and competing continuations grants will be awarded.

Objectives for 1972: In 1971 an estimated 116 research training grants will be supported. In 1972, the Institute will continue to fund this program at the same level.

Activity: Laboratory and Clinical Research (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
265	$9,254,000	Indefinite	281	$11,517,000

Purpose: Conducts research in five major program areas of child health and human development:reproduction and population, perinatal biology and infant mortality, growth and development, adult development and aging and mental retardation.

Explanation: Ten laboratories and branches conduct the Intramural Research operations in the porgram areas of the Institute. These include the Developmental Biology Branch, the Social and Behavioral Sciences Branch, the Reproduction Research Branch, the Laboratory of Biomedical Sciences, the Behavioral Biology Branch, the Children's Diagnostic and Study Branch, and the Gerontology Research Center (Baltimore), composed of the Laboratory of Molecular Aging, the Laboratory of Behavioral Sciences, the Laboratory of Cellular and Comparative Physiology, and the Clinical Physiology Branch.

Accomplishments in 1971: The intramural research program will make significant advances in the following areas: methods for examining the primate menstrual cycle in detail to permit the use of this animal model for the studies of human reproductive biology will be developed: evaluation of the effectiveness of preschool stimulation will be conducted in various environments so as to develop the most effective way to prepare children from deprived environments for adaptation to school situations; studies relating gene structure to cell function will be conducted and will open new avenues for the study of mental retardation; and human volunteers will be involved in our longitudinal studies in the physiological, biochemical, and psychological aspects of aging. The establishment of two new branches will strengthen our efforts in the development of diagnostic and therapeutic aids to improve the health of the mother, her fetus, and the new born infant.

Objectives for 1972: Sixteen positions will be added in intramural research to facilitate research efforts which will be expanded in the area of population and and reproduction, child health and aging. Particular emphasis will be placed on broadening the scientific bases of reproductive biology necessary for the development of specific contraceptive agents. To define the processes of fetal and early childhood development, programs have been initiated in developmental biochemistry, information transfer, neurophysiology, child psychology, and environmental influences on childhood maturation. Clinical programs in the high risk obstetrical patient and in the physiology of the neonatal period will be initiated.

Activity: Collaborative Research and Development (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
40	$15,469,000	Indefinite	45	$18,521,000

Purpose: Supplements the Institute's five research programs primarily through the contract mechanism and maintains and advances program liaison through support of interdisciplinary research conferences and symposia.

Explanation: Most of the funds in this activity support the contract programs of the Center for Population Research. The Center administers contracts in three main areas: research in contraceptive development; research on the medical effects of existing contraceptives; and, research in the behavioral and social sciences to develop essential knowledge concerning the determinants and consequences of population change and the nature and magnitude of changes now in process. Child health programs utilizing contract funds concentrate on nutrition, early childhood development and mental retardation.

Accomplishments in 1971: The contraceptive development program will support approximately 120 contracts in four areas of reproductive biology espically identified as likely to contribute to the development of new methods of contraception and 25 in new initiative areas of drug and device development. These are studies of sperm, ovum, oviduct, and corpus luteum functions. The behavioral sciences program will support approximately 35 contracts in broad areas of behavioral and demographic studies. Contracts will be awarded for research on the medical effects of contraceptives now in use. Child Health contracts will support studies on the effect of malnutrition on the mother and developing fetus and on the effect of nutritional supplements during pregnancy.

Objectives in 1972: The program for fiscal year 1972 is designed to expand all aspects of the population and reproduction program with particular emphasis on the development of new contraceptives. Five positions will be added to conduct research which will include identification of testing facilities for rapid exploitation of new contraceptive leads; support of drug and device development; studies of local rather than systemic methods and research on improved methods of sterilization and abortion.

In addition, research will expand in the field of early childhood development including the related aspects of nutrition and mental retardation.

Activity: Biometry, Epidemiology, and Field Studies (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
24	$2,200,000	Indefinite	24	$2,227,000

Purpose: Supports the Institute's scientific staff in planning and conducting epidemiologic and biometric investigations and conducts research in epidemiological and biometric theory, techniques, and methods; and collects and analyzes program statistics for the Institute's programs and executes statistical studies for use in program planning, development, and evaluation.

Explanation: Through the research contract mechanism, this activity supports the Institute's scientific staff in planning and conducting studies dealing with the incidence, distribution and control of health problems in certain populations. It supports development of more effective and reliable means for measuring health problems, through the collection and analysis of health data for use in initiating and evaluating scientific programs.

Accomplishments in 1971: The majority of the funds support research contracts in the Institute's five program areas: Population and Reproduction, Perinatal Biology and Infant Mortality, Growth and Development, Adult Development and Aging, and Mental Retardation. Approximately $1,626,000 will be used in 1971 in support of these programs.

Objectives in 1972: A number of new epidemiologic studies and research contracts begun in FY 1971, on the safety of oral contraceptives, infant mortality, low birth weight babies, and related phenomena will be continued.

Activity: Training Activities (Public Health Service Act, Title, IV Part E)

1971 Available Appropriation Pos.	1971 Available Appropriation Amount	Authorization	1972 Budget Estimate Pos.	1972 Budget Estimate Amount
4	$86,000	Indefinite	4	$93,000

Purpose: To provide long term scientific training for employees of the National Institute of Child Health and Human Development.

Explanation: The direct training program is one means of coping with the crucial problem of an insufficient number of trained scientists. It is a mechanism of support to the Institute's intramural, extramural, and biometry and epidemiology staff by providing supplementary or cross-disciplinary training to increase staff effectiveness.

Accomplishments in 1971: Four intramural scientists will complete their training at the end of FY 1971. These four men will return to active research in the intramural program in FY 1972.

Objectives for 1972: The Institute will again provide opportunitites for four staff members to broaden their knowledge by participating in long term training activities at excellent outside training centers.

Activity: Review and Approval (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation Pos.	1971 Available Appropriation Amount	Authorization	1972 Budget Estimate Pos.	1972 Budget Estimate Amount
92	$2,544,000	Indefinite	92	$2,808,000

Purpose: Administers the Institute's research grants, training grants, fellowships, and research contracts.

Explanation: This activity supports the Institute's extramural program staff and the grants and contracts management branch. These branches are responsible for the planning and development of research programs that will best serve the Institute's mission; reviewing and evaluating grant applications for presentation to the National Institute of Child Health and Human Development Advisory Council; providing council staff assistance and liaison with applicants and grantees; and, continuing surveillance of grants.

Accomplishments in 1971: Ths most significant event of FY 1971 will be the approval of the concept of combining the review of program projects with the review of training grants, research career development awards, and fellowships within the Institute's training review committees. This concept puts the emphasis on problems and programs rather than of the mechanisms of review. Five committees will be developed whose members will be outstanding experts in their field, but who are also fully cognizant of major problems of research support within the extramural branches. The staff will continue management of 1,023 grants including training grants and fellowships, and 221 research contracts

Objectives in 1972: The objectives of this activity in 1972 will be the administration of grants, awards and contracts in population, nutrition, early childhood development and mental retardation.

Activity: Program Direction (Public Health Service Act, Title IV, Part E)

1971 Available Appropriation			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
48	$1,029,000	Indefinite	48	$1,099,000

Purpose: Provides the general administration, planning, direction, and coordination of the Institute's programs.

Explanation: This activity funds the Office of the Director and related staff which consists of the Officer of Program Planning and Evaluation, and the administrative management offices. In addition to the Office of the Director, the positions and non-program funds for the Center for Population Research are included in this activity.

Accomplishments in 1971: During 1971 the staff of the Office of the Director continued to provide administrative management services and program guidance to the Institute's staff, in support of rapidly increasing programs.

The Center for Population Research succeeded in recruiting sufficient professional staff to direct the expansion of the research contracts program within the Center.

Objectives for 1972: In 1972, the Institute's program will increase by nearly $9 million and the main objective of the Office of the Director will be the continued effective management of this expanding program.

New Positions Requested

Fiscal Year 1972

	Grade	Number	Annual Salary
Laboratory and clinical research			
Medical Officer	GS-15	1	$21,589
Developmental Biologist	GS-15	1	21,589
Medical Officer	GS-14	1	18,531
Medical Officer	GS-13	1	15,812
Biochemist	GS-12	1	13,389
Biologist	GS-12	1	13,389
Chemist	GS-11	2	22,466
Biochemist	GS-11	2	22,466
Biologist	GS-11	1	11,233
Secretary	GS- 5	2	12,352
Technician	GS- 4	1	5,853
Secretary	GS- 4	2	11,706
		16	190,375
Collaborative research and development			
Medical Officer	GS-14	1	18,531
Health Scientist Administrator	GS-13	1	15,812
Health Scientist Administrator	GS-12	1	13,389
Secretary	GS- 5	1	6,176
Secretary	GS- 4	1	5,853
		5	59,761
Total new positions, all activities		21	250,136

National Institute of Child Health and Human Development

STATEMENT OF DR. GERALD D. LAVECK, DIRECTOR ACCOMPANIED BY GEORGE RUSSELL, EXECUTIVE OFFICER

RESEARCH PROGRAMS

Senator Magnuson. Now we have the National Institute of Child Health and Human Development, and Dr. LaVeck.

Dr. LaVeck. Mr. Chairman, the National Institute of Child Health and Human Development supports and conducts research on the special needs of the pregnant woman, the developing fetus, the child, the mentally retarded and the aging adult.

POPULATION RESEARCH

A problem of great concern to us is excessive population growth. For fiscal year 1972, our program emphasis will be in population research or family planning research. Therefore, I will concentrate my remarks on that particular topic.

In population research, we are stressing three areas of particular interest:

First, we are attempting to develop new contraceptive methods. No methods currently available are fully satisfactory. We feel there is a need to develop an array of new ones. By the end of the current fiscal year, we anticipate that we will have obtained and had synthesized a number of compounds that have antifertility properties and probably will have tested many in animals for their efficacy as well as toxicity.

It is also possible that some clinical trials with humans will be initiated in the current fiscal year.

We are looking, for example, for a once-a-month pill that a woman can take at the time of her expected menses and for a modern male method of contraception.

Another major area of interest is the medical effect of existing contraceptives.

The oral contraceptives or the pill do have adverse medical effects; particularly a blood-clotting disorder may occur in pill users and this in turn may result in death.

The institute will be supporting studies this coming year on why oral contraceptives cause hypertension in some women. Also, we will be seeking optimal formulations and dosages of the oral contraceptives.

Finally, in the area of population research, we are interested in the social sciences. We have supported a national fertility study, which demonstrated that 20 percent of all babies born of married couples between 1960 and 1965 were unwanted. That is one-fifth of all births during those years were unwanted. The point I am trying to make is that there is widespread failure to limit family size to the number of children wanted.

The Institute is supporting research on the economic, psychological and social factors that enter into the decisionmaking process of couples in regard to family size.

NATIONAL FERTILITY SURVEY

Senator MAGNUSON. Doctor, I don't question your figures. but how do you arrive at the determination of an unwanted child? How do you know?

Dr. LAVECK. This was done by asking both parents, or the mother, whether each child was wanted or not.

Senator COTTON. Who did it?

Dr. LAVECK. Skilled interviewers who are experienced in asking sensitive questions.

Senator MAGNUSON. Who hires the interviewers?

Dr. LAVECK. This was done on a contract with Princeton University. Princeton University in turn, contracted to hire the interviewers.

Senator COTTON. You caused it. It was Federal funds?

Dr. LAVECK. Yes. It was Federal funds.

Senator COTTON. Is it the same Princeton outfit that makes surveys for politicians? Is it professional?

Dr. LAVECK. This is a professional group, the Office of Population Research at Princeton University.

Senator COTTON. It is a sampling.

Dr. LAVECK. It is a sample, but a carefully selected sample, representative of the Nation's married women. It has the defects that any type of sampling procedure has.

Senator MAGNUSON. I don't want to be facetious, and this is off the record.

(Discussion off the record.)

Dr. LAVECK. There are defects in these kinds of studies but they are the best tools we have in determining public feelings in this field. This particular study was conducted by highly skilled investigators with considerable experience in this type of research.

Senator COTTON. In that research, were there any indications or an attempt to ascertain, for instance, what income groups were represented?

Dr. LAVECK. Yes. Unwanted children were found to be more prevalent when couples had incomes of less than $3.000 a year. Also educational level was important since unwanted children were identified twice as often when wives had not completed high school. Therefore couples with more education and more money have fewer unwanted pregnancies.

CHILD HEALTH RESEARCH

Another major responsibility of the Institute is for child health research. In fact, this is our largest program. However, the increase for 1972 will be primarily for mental retardation so I will confine my child health remarks to mental retardation.

MENTAL RETARDATION RESEARCH CENTERS

As you know, there are 12 mental retardation research centers in various locations throughout the country.

Senator MAGNUSON. So that we are clear on the record again, these are centers purely for research?

Dr. LAVECK. That is correct.

Senator MAGNUSON. We have many other centers for treatment or counseling, mainly?

Dr. LAVECK. Yes; that is correct.

Senator MAGNUSON. But these are research centers.

Dr. LAVECK. Yes, sir.

Senator MAGNUSON. All right.

Dr. LAVECK. We have requested in this budget $1.5 million for the support of mental retardation research centers.

There are about 6 million Americans who are mentally retarded. About 200,000 are in institutions for the mentally retarded. Close to 700,000 receive special education. The cost in terms of dollars is about $8 billion per year.

This is a significant problem that requires considerable research to find ways to prevent and ameliorate mental retardation.

Our third major program area is research on the aging process.

UNIVERSITY OF WASHINGTON CENTER

Senator MAGNUSON. Now, I want to get this clear and, Senator Cotton, you will excuse me again for getting geographical.

Senator COTTON. Yes. Take care of Seattle.

Senator MAGNUSON. Wouldn't one of these research centers, a typical one, be the one at the University of Washington?

Dr. LAVECK. Yes, sir. The University of Washington Child Development and Mental Retardation Center is the largest center.

NON-FEDERAL SUPPORT OF CENTERS

Senator MAGNUSON. But it is not all federally funded; there is a lot of local participation and university participation.

Dr. LAVECK. Approximately 30 percent of all support for the centers is supplied by the universities or other non-Federal sources.

Senator COTTON. You mean 30 percent of the funded in all centers?

Dr. LAVECK. Yes, sir. Non-Federal support amounts to about 30 percent of the cost of research.

MEDICAL IMPLICATIONS IN OCEANOGRAPHY

Senator MAGNUSON. Doctor, would you suspend for just a moment? I want to ask one question of Dr. Marston.

I have here with me today, and I want to go out and spend about 5 minutes with him on some other projects, the Oceanographer of the Navy. We have been pretty deep in oceanography in our Commerce Committee.

Generally speaking, do some of the fields of oceanography have some medical implications?

Dr. MARSTON. Some of them.

We have had discussions on this over the years and the Institutes have been alert to areas where there might be overlap or where there might be activities of interest to us.

Senator MAGNUSON. For instance, we had some testimony on research on using a certain kind of Elmer's glue for teeth.

Dr. MARSTON. Yes; in the dental area.

Senator MAGNUSON. Then in the Institutes——

Dr. MARSTON. The Institute of General Medical Sciences has been interested in it.

Senator MAGNUSON. Some of these people in that part of the field of oceanography claim we can learn a lot through research in marine life, medical research, nerves, for instance, nervous systems.

Dr. MARSTON. Dr. Rall, sitting behind me, has been using some of the sea life, some critical studies on the transfer of substances across nervous system—blood boundaries.

I believe he recently returned from a trip on which he found another marine organism for critical experiments on this problem. It is an interesting story because part of the problem in treating patients with some form of cancer is the problem of getting the drug across the brain blood barrier. The prognosis in a disease such as Burkitt's lymphoma changes from almost 100 percent favorable to almost 100 percent unfavorable when the central nervous system becomes involved.

Dr. Rall's work has been to try to find out how you can get around this problem. He has been using sea animals.

Dr. RALL. The spiny dogfish, a little shark about this long.

Senator MAGNUSON. I have heard, I don't think it is a definite conclusion, but marine biologists suggest that they do not find in marine life evidences of cancer unless they have a vertebra, which might say something. Vertebra marine life has cancer, but those without a vertebra, a squid or something like that, you never find any incidence of cancer.

Dr. RALL. They do. There is a very low incidence, but it does occur.

Senator MAGNUSON. They thought they were on the trail. It goes to show there is trial and error on these things.

Go right ahead.

AGING RESEARCH

Dr. LAVECK. Moving on to aging research, I would like to point out that there have been a number of significant advances during the past few years.

GERONTOLOGY RESEARCH CENTER

We have exciting research going on in Baltimore at the Gerontology Research Center which houses our intramural program for aging. We also have a very successful training program in the field of aging preparing young investigators for careers in this field.

In summary, the budget request is for $103,232,000, an increase of $9,556,000 over the 1971 level.

Program funds include a $9.6 million increase for population research; a $460,000 increase for child health research, and a decrease in aging research of approximately $1.3 million.

Thank you.

OFFICE OF MANAGEMENT AND BUDGET REDUCTION

Senator COTTON. Now, the budget as it finally came down to us, the difference between the agency's request after the Department of the Budget got through, you were roughly $18 million less; is that right?

Dr. LAVECK. Yes.

AGING AND CHILD HEALTH GRANT REDUCTIONS

Senator COTTON. Now you have a net program increase of $8 million plus but you are cutting aging and child health grants by $3 million plus.

Dr. LAVECK. That is correct.

Senator MAGNUSON. Of necessity, I suppose those two activities had to take some of that cut because of the other segment of your general activity.

Dr. LAVECK. Population research received a large increase.

In child health, we have an increase in research grants in mental retardation of $1.5 million. This is offset by a cut in other research grants for child health of $1.8 million and a cut of $1.3 million in aging research.

What you have said is essentially correct, but we did have increases in selected parts of child health offset by selected decreases.

POPULATION RESEARCH PRIORITY

Senator COTTON. Why did you feel it necessary to cut aging and child health grants by $3 million plus? The answer you just gave me doesn't quite register with me. Perhaps I didn't understand it.

Dr. MARSTON. Dr. La Veck did not make that decision. The decision was made as a part of the decision to give population research an increase of $9.6 million. The decrease in child health was simply a question of priority with a limited amount of money.

The aging one, I think, is a very special case.

This morning, at the Secretary's staff meeting, former Secretary Fleming was describing the White House Conference on Aging which is coming up later this year.

The only thing I can say here is what I have said before, that the preparation of the 1972 budget was carried out under considerable financial restraint. In this Institute, there was a strong desire to have a major increase in the population research area. The aging budget was cut by $1.3 million.

AGING RESEARCH

Senator COTTON. I am supposed to be coldblooded, and perhaps I can say this because I am 71 years old, myself, and can speak for the aged. Congress does all it can to make life more palatable and less frustrating for the aged. That is, some of us have been trying a long time to take away some of the restrictions on retired people working and earning and trying to do many things to make—it is unfortunate to have medical science prolong life only to have the later years spent in loneliness and frustration.

I suppose, physically speaking, to be perfectly coldblooded about it, the more you can do for child health the more you can do for the aged.

You can't stop the ravages of age even though you may be able to——

Dr. MARSTON. Ultimately, you are right, but I think that statement does need to be modified in the light of some of the work being done here.

RESEARCH OBJECTIVES

Dr. LAVECK. We are not attempting only to prolong life but to make life better by improving the health and social aspects for the aging population. So, I think we can't ignore this very important area.

Senator COTTON. Far be it from me because I have always fought—even before I was so old, myself, I fought for it.

I think the retired people get the tough end of the log to lift in our society because there are limitations on fixed income; they are the hardest hit by inflation: all the other things.

But, what specifically, are your objectives physically in helping the aged?

Dr. LAVECK. One of the primary objectives is to determine why body cells change with age. This fundamental problem has not been answered.

We have been supporting a number of studies, particularly using tissue culture where cells can be examined as they divide. DNA and RNA are being studied to determine their role in aging.

We also want to know how the aging process relates to disease entities. In our own laboratories, we have been studying glucose metabolism. As an individual ages his ability to handle carbohydrates deteriorates, so in many respects he resembles a diabetic.

Therefore, it is important for physicians to know that there are changes that occur during the life span that one must keep in mind in treating illnesses.

We also have been interested in a rather unique experiment in which we have been able to teach individuals to control the rate of their heart. They can speed their heart rate or decrease it at will.

There are some clinical implications. It may be possible to treat heart patients who have extra beats or abnormal rhythms using this technique. Control of heart rate can result in fewer extra beats.

Senator COTTON. I have extra beats and the doctor said it wasn't anything significant.

Dr. LAVECK. In some cases, it is not significant. In others, particularly following serious heart disease, abnormal rhythms are serious.

Senator COTTON. This question is on family planning coordination.

First, you have already told us what the additional $9.6 million for population reproduction research will be spent for. The whole amount is $37.7 million on population research.

Dr. LAVECK. That is correct.

Senator COTTON. You not only have this pill but you also are trying to perfect the kind of pill that doesn't have bad side effects.

Dr. LAVECK. That is correct.

Senator COTTON. The pill that is used now is a daily pill, isn't it?

Dr. LAVECK. Yes, it is taken daily for 3 weeks each month.

Senator COTTON. You are trying to produce something that will be just a monthly pill?

Dr. LAVECK. That is one of our goals, a monthly pill, to be taken at the time of the expected menses.

COORDINATION OF PROGRAMS: FUNDING EXPENSE

Senator COTTON. Now, on family planning coordination, the figures provided by the House Appropriations Subcommittee indicate that the Department is requesting a total of $984 million for family planning and population research, mental retardation programs, and nutrition programs.

Who in the Department oversees or coordinates these programs and how does your Institute research programs relate to them?

FAMILY PLANNING

Dr. LaVeck. You group the number of different programs together. Let me handle the family planning one first. This is a very well coordinated program. The Deputy Assistant Secretary for Population Affairs, Dr. Louis Hellman, has the responsibility in the Secretary's office for coordinating these efforts. I assure you there is no research that we are doing that is being done by another agency at HEW.

Senator Cotton. Or any other agency?

Dr. Marston. Or any other agency.

We have had occasion, within the last 2 years, to look repeatedly for possible overlap with the other major supporters of family planning research which is AID. We can say, without any concern, that while we work with them and are coordinated with them there is no overlap in that area.

Senator Cotton. Their function is really to transmit the information that you come up with to certain areas in the world?

Dr. Marston. No, sir. AID supports research programs. They have a different approach and a different bias than Dr. LaVeck's Institute. They are supporting biomedical research from a different standpoint.

Senator Cotton. Can you quickly give us an idea what is the difference in approach?

Dr. LaVeck. We have worked very closely with AID to get agreement here. In 1969, when little was being done in this field, it is true that both agencies, our Institute and AID, moved in to support research on the development of new contraceptive agents. The agreement that we now have is that our Institute will be responsible for supporting research carried out in this country looking for new contraceptive agents, whereas AID will support research of this kind in underdeveloped countries.

This is the goal that are are pursuing so that the functions will be different, particularly in regard to geography but also AID will be more involved in applied research.

SUBMISSION FOR RECORD OF FUNDING FOR FAMILY PLANNING AND MENTAL RETARDATION

Mr. Miller. Mr. Chairman, I would like an opportunity, if I may, to look at the record and look at what we supplied the House. If I heard your figure correctly, it was over $900 million.

I suspect that that includes the entire amount for social services under public assistance.

What I would like to do is put in a table which includes not only family planning but mental retardation. It would be a much lower figure than that.

Senator Cotton. You may insert it at this point.

Mr. MILLER. I think we ought to break it down by family planning and mental retardation.

If there is any other component in there, we will show it.

(The information had not been furnished at the time of printing.)

COORDINATING ACTIVITY RESPONSIBILITY

Dr. LAVECK. The Secretary's committee on mental retardation is responsible for coordinating activities in that particular field.

So far as nutrition is concerned, there was an assistant to the former assistant secretary for health and scientific affairs who had that responsibility but there is very little in the way of overlap in regard to research.

NUTRITION RESEARCH

At the NIH, there are other Institutes that are involved in nutrition research but we all have a different interest. Ours is in growth and development as this relates to nutrition.

Senator COTTON. Does agriculture go into nutrition research?

Dr. LAVECK. I am not aware of research on humans supported by the Department of Agriculture but I am not certain.

Dr. MARSTON. I don't think so.

There have been a number of cooperative meetings on the implications of the Department of Agriculture's activities in furnishing food stamps, things of that kind. Of course, there are programs on nutrition in animals.

Senator COTTON. I was thinking that the Department of Agriculture has quite a function to play in furnishing food for the poor and so on. Offhand, I would assume they must have some research functions to make sure that they are furnishing the right kind of food.

Dr. LAVECK. We would be pleased to add this for the record, if you would like.

Senator COTTON. I wish you would at this point.

(The information follows:)

PROGRAMS IN NUTRITION RESEARCH

HUMAN NUTRITION RESEARCH DIVISION

AGRICULTURAL RESEARCH SERVICES

U.S. DEPARTMENT OF AGRICULTURE

The Human Nutrition Research Division administers a research program to determine human needs for foods, nutrients and diet patterns which can assure the well-being of man and serve to guide the nation's agricultural programs.

Funding level during FY 1971:

Intramural research	$2,927,000
Extramural research	250,000
Total	3,177,000

COORDINATION OF NUTRITION RESEARCH

Senator COTTON. The next question is on the same topic.

How much does your Institute and the Institute of Arthritis and Metabolic Diseases spend on nutrition research?

What is the reason for maintaining research in separate Institutes? How is this research coordinated?

Dr. LaVeck. Our Institute spends approximately $7.5 million per year on nutrition research. I don't know precisely how much arthritis and metabolic disease is spending.

Dr. Marston. In the 1972 budget, it is $7,254,000. That is an increase of just under a million dollars compared to the 1971 budget. That is for arthritis and metabolic diseases.

Dr. LaVeck. Our research is limited to the effect of nutrition on growth and development, whereas in the Arthritis Institute the scope is much broader. They are interested in inborn errors of metabolism, nutritional deficiencies, and the physiological actions of various nutrients in the body to mention a few of their interests.

Dr. Marston. As you know, we have a complete coordinating mechanism across all of the grant programs, across the intramural programs and across collaborative programs. We have a central receiving area for all grant applications which are then screened and sorted out. At times there could be a given grant that would be sent both to Dr. LaVeck's Institute and to the Arthritis Institute but this would be done knowingly and, of course, only one would be paid. This is NIH-wide. All applications for grants come into a central office, the Division of Research Grants.

We maintain coordination and control on handling grant applications all the way through until they are paid. All the records are kept in a central area.

Senator Cotton. You also know what other divisions of HEW Department does?

Dr. Marston. Yes, sir.

Senator Cotton. Do you necessarily know what other departments are doing, other Government agencies and departments?

Dr. Marston. There has been, because of the administration's interest in the whole problem of nutrition, a series of task forces and coordinating mechanisms, particularly in this area across all of the departments of Government.

AGING RESEARCH REDUCTION

Senator Cotton. Now, we had some outside witnesses complaining that the reduction is in the research program for the aged. I think you have answered as to the reason why it was cut $1,041,000. I think that is already covered.

Dr. Marston. The only thing I want to add is that we are also concerned at the reduction in aging.

I would not want there to be any implication that either the Child Health and Human Development Institute or NIH or the Department is not interested in the problem of aging or that this dollar budget reflects any lack of interest.

Senator Magnuson. It is a difficult problem as a practical matter because everything you are doing in all the institutes has something to do with the problems of the aging.

Dr. Marston. That is true.

Vascular disease and neurological disease and stroke are all a part of the aging.

Off the record.

(Discussion off the record.)

Senator Cotton. All told, between the Department and the Bureau of the Budget, you were slashed $18 million.

Dr. Marston. Right; from the original request.

Senator Cotton. You had to find places to take that reduction.

Dr. Marston. Yes, sir.

Senator Cotton. This is one of the places but you are not quite sure, and this one place causes you some concern.

Dr. Marston. This reduction causes us considerable concern; yes, sir.

Senator Cotton. Is it fair to say that if you had a suggestion to the committee of remedying a defect and given a little more money this should be at this point?

Dr. Marston. This would be one of the highest priorities for any additional funds.

SUBCOMMITTEE RECESS

Senator Magnuson. Thank you very much.

We will recess until 2:30.

We will begin with the Eye Institute. Then we will see if we can get through with the witnesses today. We will go as long as we can this afternoon. We still have Dr. Endicott with his department, and Dr. Cummings.

(Whereupon, at 12:30 p.m., the subcommittee was recessed to reconvene at 2:30 p.m.)

(AFTERNOON SESSION, 2:30 O'CLOCK, WEDNESDAY, JULY 21, 1971)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NATIONAL INSTITUTES OF HEALTH

NATIONAL EYE INSTITUTE

Justifications

Appropriation Estimate

NATIONAL EYE INSTITUTE

For expenses necessary to carry out Title IV, part F, of the Public Health Service Act, with respect to eye diseases and visual disorders, [$30,986,000] *$32,639,000.*

Amounts Available for Obligation

	1971	1972
Appropriation............................	$30,986,000	$32,639,000
Real transfer to:		
"Departmental Management".............	-2,000	---
"Office of the Director" (Proposed transfer for increased pay costs).........................	-461,000	---
"St. Elizabeths Hospital" (Proposed transfer for increased pay costs).........................	-494,000	---
Comparative transfers to:		
"Office of the Director"..............	-8,000	---
"Health Manpower".....................	-773,000	---
Comparative transfers from:		
"National Institute of Allergy and Infectious Diseases"................	69,000	---
"National Institute of Neurological Diseases and Stroke"................	1,088,000	---
Total, obligations...............	30,405,000	32,639,000

Obligations by Activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase or Decrease Pos.	Increase or Decrease Amount
	Grants:						
138	Research..............		$20,754,000		$23,535,000		$+2,781,000
	General research support grants.......		(1,551,000)		(1,381,000)		(-170,000)
	Scientific evaluation and planning.........		(25,000)		(25,000)		---
	Categorical clinical research centers.....		(686,000)		(686,000)		---
142	Fellowships...........		1,676,000		876,000		-800,000
143	Training..............		2,225,000		2,225,000		---
	Direct Operations:						
144	Laboratory and clinical research....	51	2,925,000	61	3,075,000	+10	+150,000
145	Collaborative research and development......	--	1,332,000	--	1,332,000	--	---
146	Biometry, epidemiology, and field studies....	15	369,000	15	385,000	--	+16,000
147	Review and approval of grants...........	24	769,000	24	821,000	--	+52,000
147	Program direction......	13	355,000	13	390,000	--	+35,000
	Total obligations...	103	30,405,000	113	32,639,000	+10	+2,234,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions.....	103	113	+10
Full-time equivalent of other positions.	8	8	--
Average number of all employees........	98	106	+8
Personnel compensation:			
Permanent positions..................	$1,299,000	$1,525,000	+$226,000
Positions other than permanent.......	84,000	99,000	+15,000
Other personnel compensation.........	14,000	14,000	---
Total personnel compensation.......	1,397,000	1,638,000	+241,000
Personnel benefits...................	136,000	155,000	+19,000
Travel and transportation of persons.	67,000	67,000	---
Transportation of things............	17,000	17,000	---
Rent, communications, and utilities..	18,000	19,000	+1,000
Printing and reproduction...........	27,000	27,000	---
Other services:			
Project contracts................	1,332,000	1,332,000	---
Payment to NIH Management Fund....	1,733,000	1,819,000	+86,000
Other...........................	490,000	495,000	+5,000
Supplies and materials..............	166,000	166,000	---
Equipment...........................	367,000	268,000	-99,000
Grants, subsidies, and contributions.	24,655,000	26,636,000	+1,981,000
Total, obligations by object.......	30,405,000	32,639,000	+2,234,000

Summary of Changes

1971 estimated obligations....................................	$30,405,000
1972 estimated obligations....................................	32,639,000
Net change..	+ 2,234,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs.............	--	--	--	+ 85,000
2. Annualization of positions new in 1971................	--	--	--	+ 52,000
3. Within-grade salary increases..................	--	--	--	+ 23,000
4. Extra day pay costs........	--	--	--	+ 6,000
5. FTS rate increase..........	--	--	--	+ 1,000
6. Non-competing research grants.....................	--	$ 11,450,000	--	+5,636,000
B. Program:				
1. Laboratory and clinical research..................	51	2,900,000	+10	+ 99,000
C. Payment to "National Institutes of Health Management Fund" for centrally-furnished services		1,733,000		+ 86,000
Total, increases.........	--	--	+10	+5,988,000
Decreases:				
A. Program:				
1. Competing research grants..	--	7,042,000	--	-2,685,000
2. General research support grants.....................	--	1,551,000	--	-170,000
3. Fellowships...............	--	1,676,000	--	-800,000
4. Laboratory and clinical research..................	51	2,900,000	--	-99,000
Total, decreases.........	--	--	--	-3,754,000
Total, Net Change........	--	--	+10	+2,234,000

Explanation of Changes

Built-in Increases - These increases will provide: $85,000 for annualization of 1971 pay increase costs; $52,000 for the annualization of positions new in 1971; $23,000 for within grade salary increases; $6,000 for the cost of an extra day of pay; $1,000 for increased costs of using the Federal Telecommunications System; and $5,636,000 for the continuation of non-competing research grant awards.

Research Grants - The program decrease of $2,685,000 for competing research grants will result in a reduction of approximately 60 new and renewal awards in 1972. The request also includes a decrease of $170,000 for general research support grants, a program included in each NIH appropriation containing research grant projects, but administered separately by the Division of Research Resources.

Fellowships - The reduction of $800,000 in 1972 will result in 71 fewer awards than were funded in 1971.

Laboratory and Clinical Research - The budget request includes a decrease of $99,000 for equipment and an increase of a like amount to support 10 new positions for the intramural research program of the Institute.

Significant Items in House and Senate Appropriation Committee Reports

Items

1971 House Report	Action Taken or to be Taken
(1) The Committee expressed its desire that the administrative structure of the Institute be adequate in jobs and salaries.	(1) The 1971 budget included an increase of sixteen positions. The Institute used these positions to appoint a Clinical Director, a Chief for the Office of Biometry and Epidemiology, and to recruit professional and technical staff in Program Direction and laboratory and clinical research activities. The 1972 budget request includes a moderate increase of 10 positions to strengthen the Laboratory of Vision Research and the Clinical Branch of the Institute's intramural research program.
1971 Senate Report	
(1) The Committee repeated, with greater emphasis, the concern it expressed in the previous year for the adequacy of positions allocated to the Institute.	(1) As noted above, the Institute was allocated sixteen new positions in 1971, and requests an additional ten positions in 1972 to strengthen the in-house research effort.
(2) The Committee Report noted that special opportunities exist for significant progress in several areas of vision research, particularly in retinal disease, corneal disease and glaucoma.	(2) The Institute has emphasized new projects in these areas, placing particular emphasis on diabetic retinopathy, and other retinal disorders. In 1972 further efforts will be undertaken to exploit opportunities for research progress in these areas, including more extensive use of research contracts to fund staff directed projects in drug therapy of glaucoma and the development of improved diagnostic techniques for retinal disorders.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act Section 301--Research and Investigations in General..............................	Indefinite	$ 32,639,000
Title IV, Part F--National Eye Institute....	Indefinite	32,639,000

PUBLIC HEALTH SERVICE ACT

The legislative authority which provides for the award of grants for research, research training and fellowships is included in section 301 of the Public Health Service Act.

Public Law 90-489
90th Congress, H.R. 12843
August 16, 1968

"Sec. 451. The Secretary is authorized to establish in the Public Health Service an institute for the conduct and support of research for new treatment and cures and training relating to blinding eye diseases and visual disorders, including research and training in the special health problems and requirements of the blind and in the basic and clinical sciences relating to the mechanism of the visual function and preservation of sight. The Secretary is also authorized to plan for research and training, especially against the main causes of blindness and loss of visual function."

Explanation of Transfers

Real transfer to:		
Departmental Management	-$2,000	To establish the Facilities Engineering and Construction Agency
Office of the Director	-461,000	Proposed transfer for increased pay costs
St. Elizabeths Hospital	-494,000	Proposed transfer for increased pay costs
Comparative transfer to:		
Office of the Director	-8,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director
Health Manpower	-773,000	Transfer of institutional support funds to Health Manpower

Comparative transfer from:

National Institute of Arthritis and Metabolic Diseases	+69,000	To provide an equitable distribution of the Management Fund in 1972
National Institute of Neurological Diseases and Stroke	+1,088,000	To provide an equitable distribution of the Management Fund in 1972

National Eye Institute

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1970 [1/]	$23,685,000	$23,685,000	$25,000,000	$24,342,500
1971	25,686,000	30,986,000	30,986,000	30,986,000
1972	32,639,000			

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	103	1,533,000	113	1,793,000	+10	260,000
Other expenses.........	---	28,872,000	---	30,846,000	---	+1,974,000
Total............	103	30,405,000	113	32,639,000	+10	+2,234,000

General Statement

The National Eye Institute was created in 1968 to conduct and support basic and applied research on disease problems of the eye and visual system. Institute programs are implemented through grants and contracts with individuals and research organizations working on problems of visual health, and through laboratory and clinical research conducted by Institute personnel.

Millions of Americans are socially and economically handicapped by blindness and visual impairment. Available statistics indicate that nearly 100,000,000 Americans have some form of eye disorder or impaired vision. Each year more than 350,000 more Americans are afflicted with serious visual disability. The resulting expenses of care, rehabilitation and treatment, as well as lost productivity, constitute an enormous cost to the nation. This great economic loss, the cost of a deplorable waste of human resources, requires a most vigorous program of research on the prevention of visual disorders, and on the care and rehabilitation of afflicted individuals. The National Eye Institute serves as the focal point for such an effort.

1/ Prior year appropriations were included within the National Institute of Neurological Diseases and Stroke.

Institute scientists and grantees are engaged in research efforts to advance our understanding of the visual process and to attack the full range of vision disorders affecting large segments of the population. Their investigations have contributed significantly to our knowledge of normal visual function and to the development of more effective means for the prevention, diagnosis and treatment of retinal disorders, corneal disease, glaucoma, cataracts, and inflammatory diseases of the eye. Progress in each of these areas has been, and will continue to be, dependent upon the support of laboratory and clinical research in the wide variety of disciplines associated with vision.

Special opportunities exist for accelerating the application of current knowledge and technology to the management of corneal and retinal disease and glaucoma. A scientific base has been created for the further development of a soft corneal contact lens which has already proven useful in eliminating the pain of bullous keratopathy, a common result of corneal disease, and has often significantly increased visual acuity. Progress against retinal disease can be speeded through research to develop new techniques for "spot welding" the retina to the underlying choroid at the site of retinal detachment. In the clinical management of glaucoma, information presently available would permit the development of new and more effective drugs, less destructive surgical procedures, and improved early diagnosis.

Within the resources requested for the National Eye Institute in 1972, efforts will be sustained to exploit opportunities for advances in the prevention, diagnosis and treatment of retinal disorders. These studies will be primarily concerned with retinal detachment, diabetic retinopathy, and the elucidation of the means by which light is converted by the retina to electrical energy and coded to create the sense of sight. In addition, progress against glaucoma, cataract, developmental abnormalities, strabismus, and other visual disorders will be fostered through the continuation of essential ongoing studies on these problems.

Research Grants

	1971	1972	Increase or Decrease
Research projects.........	$18,492,000	$21,443,000	+$2,951,000
Special projects..........	2,262,000	2,092,000	- 170,000
Total research grants	20,754,000	23,535,000	+ 2,781,000

Introduction

The Institute sponsors over 400 research projects at universities, hospitals, research institutes, and other public and private nonprofit institutions. Through these grants the Institute stimulates and supports research on problems related to the prevention, diagnosis, and treatment of visual disorders, as well as fundamental studies essential to an understanding of the eye and the visual system. Grant-supported projects vary from the relatively circumscribed activities of an individual scientist to broadly-based programs that integrate the effort of groups of investigators in a variety of scientific disciplines. They include traditional research projects, research program projects, eye clinical research centers, and eye outpatient clinical research centers.

Program Plans in 1971 and 1972

Diseases of the Retina and Choroid

The retina is the photoreceptive tissue lining the eye that converts light into nervous impulses which are transmitted to the brain allowing us to see. It is nourished by the choroid, the adjacent specialized vascular tissue exterior to the retina. Disorders of these tissues include retinal detachment, diabetic retinopathy, retinal and macular degenerations, congenital anomalies, and circulatory disturbances. These disorders, most of which increase with advancing age, cause approximately 40 percent of the reported cases of blindness in the United States. With increasing longevity, the occurrence of these diseases is rising, and the therapy for some remains controversial.

In 1971 and 1972 the Institute will support studies to further evaluate the effectiveness of photocoagulation techniques to arrest or reverse the impaired vision and vascular proliferation characteristic of diabetic retinopathy and other forms of retinal disease. The observation that freezing the tissues (cryosurgery) is more beneficial than previous treatment for retinal detachment suggests that continued support for the development of this technique could eliminate the necessity for patient hospitalization. Investigations of ultrasonic therapy conducted by Institute grantees may lead to the means of hastening reabsorption of vitreous hemorrhages from the retina. Fluorescein angiography, a newly developed technique that permits direct viewing of the blood vessels of the retina and choroid, will be exploited to understand the effects that circulatory changes may have in producing disease states.

Investigations of the basic mechanisms of retinal function are essential for an understanding of visual disorders, their diagnosis and their treatment. For example, recent studies that relate the embryological development of photoreceptor cells with electroretinographic estimates of visual function portend new methods for the early diagnosis of visual impairments in infants and young children. During 1971 and 1972 support will be maintained for projects that investigate how light energy causes biochemical changes in the visual pigments, how these changes generate electrical responses in retina cells, and how these bioelectric pulses are coded, processed and finally decoded in the brain to create the sensation of sight.

Corneal Disease

Despite the advent of effective antibiotics and anti-inflammatory agents, infectious diseases of the eye continue to be an important clinical problem. Keratitis and conjunctivitis, for example, affect large numbers of patients in all parts of the world. In FY 1971 and FY 1972 the Institute will support continued efforts to identify causative agents, to describe the development of disease in terms of host parasite relations, and to determine the epidemiology and natural history of infectious diseases, Emphasis will also be placed on the development of new medicinal and immunological treatments and on the surgical and prosthetic alleviation of damaged ocular tissue. These efforts will be enhanced by recent promising developments in the use of tissue adhesives to seal wounds and to fasten contact lenses on the cornea. Recent hypotheses that an infectious rather than an allergic agent may be responsible for certain types of corneal disease and that neonatal inclusion conjunctivitis may be ascribable to a trachoma infection will be examined. Efforts will be made to improve a vaccine against the trachoma agent, still the leading cause of blindness in the world.

Glaucoma

Glaucoma is a group of diseases characterized by an elevation of pressure within the eye that leads to damage of the optic nerve and a subsequent loss of vision. Visual loss can be arrested or prevented by medication or surgery, but since glaucoma is initially symptomless, an irreparable loss of vision may occur before the disease is discovered. An important research goal, therefore, is the early identification of individuals likely to lose vision so that treatment can be initiated. Approximately 2 percent of the population over the age of 40 are victims of glaucoma, and genetic studies suggest that about 4 percent of the total population may have an hereditary predisposition to develop this disease.

Epidemiological and genetic studies are needed to develop a means by which individuals predisposed to glaucoma may be identified. Such investigations will be stimulated and abetted by the recent observation that topically applied corticosteroids induce elevated intraocular pressures. The ability to induce elevated pressures also provides a new model for evaluating medications and for studying the body's normal mechanism for controlling ocular pressure. The fundamental nature of the abnormal situation will only be understood when the normal mechanisms are known. One of the most promising areas involves the role of the sympathetic nerve supply to the eye and its effect on regulating intraocular pressure by controlling the release of endogenous norepinephrine. Additional studies are also needed on both the inflow and the outflow of intraocular fluids, as well as on the exact mechanism by which elevated ocular pressures damage the optic nerve.

Cataract

Cataract is one of the leading causes of blindness in the United States. It accounts for approximately 22 percent of all blind persons in this country. Congenital defects, systemic and infectious diseases and injury can result in cataract formation. However, the most common type is senile cataract so called because it appears to be part of the general aging process in the human body. A cataract is a loss of transparency or a clouding of the ocular lens. While the exact causes of most varieties of cataracts remains uncertain, they seem to be related to changes in the normal balance of soluble and insoluble lens proteins. Technical advancements have made cataract surgery a safe and satisfactory practice, but the development of a medical treatment for cataract or for the prevention of cataract awaits further research. Recently for the first time, experimental cataract has been successfully prevented in incubated lenses by the use of an inhibitor.

In 1972 the Institute will continue to support research on the mechanisms of cataract formation and inhibition, on the physical and chemical characteristics of lens proteins and changes in these proteins, and on the development of preventative medicine and medical treatment as a substitute for cataract surgery.

Oculomotor Disorders

Binocular vision is a complex process in which the brain must maintain the fixation of both eyes upon an object, moving or stationary, and integrate the incoming images from two retinas in a way that conveys the unique property of depth perception. Deficiencies in either the motor or sensory elements that contribute to this performance results in strabismus, a deviation of an eye which a patient cannot overcome. The habitual deviation of an eye may lead to amblyopia and the loss of visual acuity. To understand the sensory and motor elements that contribute to binocular vision, basic and clinical investigations are needed in: neuroanatomy, neurophysiology, the cerebral control of the oculomotor system, the accommodative mechanism, the nature of fusion, myopathic disorders of ocular motility, and the effects of aging on the oculomotor system. These investigations in 1971, and 1972 will be aided by a newly developed instrument that can record ocular movement by sensing the amount of infrared light reflected from the ocular surface when the eye is rotated. An animal model for studying amblyopia has become available as the result of an observation that visual behavior patterns of surgically induced strabismic monkeys and of monkeys unilaterally deprived of sight from birth is strikingly similar to that of strabismic and amblyopic human patients. Support will be provided for the development of new techniques to restore binocular vision skills and in the search for drugs that can reduce the need for surgery which remains the principle means for attempting to correct strabismus.

Other Research

Grant-supported studies will continue to investigate the treatment and the biochemical and pathological mechanisms of eye injuries that result from accidental exposure to external chemicals, penetrating foreign bodies, systemic poisoning, adverse side effects from drug therapy, and mechanical trauma. The Institute will also support the development of better instruments and techniques for microsurgical repair of eye wounds and for the localization and removal of both magnetic and non-magnetic foreign bodies that enter the eye. A further area of emphasis will be on biomedical engineering investigations to develop reading and mobility aids for the blind and near blind.

Summary

The 1972 budget request for research grant programs sponsored by the National Eye Institute is $23,535,000, a net increase of $2,781,000 over the 1971 level. An increase of $5,636,000 is requested for noncompeting research grants to permit the continuation of research projects awarded prior to 1972. The amount available for new and renewal grants is decreased from $7,042,000 in 1971 to $4,357,000 in 1972, a total reduction of $2,685,000. Support for Eye Categorical Clinical Research Centers is maintained at the 1971 level of $686,000, and the request includes a reduction of $170,000 in 1972 of the Institute's proportionate share of the General Research Support Grant program.

Research Grants Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
Corneal disease	$ 2,900,000	$ 3,100,000	+$ 200,000
Glaucoma	2,219,000	2,574,000	+355,000
Uveitis	370,000	429,000	+59,000
Cataract	1,538,000	2,043,000	+505,000
Chemical toxicity and physical trauma	370,000	429,000	+59,000
Retinal disease	4,808,000	5,576,000	+768,000
Choroidal vascular disease	546,000	845,000	+299,000
Developmental defects	916,000	1,275,000	+359,000
Disorders of visual system	3,900,000	4,100,000	+200,000
Diseases of the oculomotor system	925,000	1,072,000	+147,000
Subtotal	18,492,000	21,443,000	+2,951,000
General research support grants	1,551,000	1,381,000	-170,000
Scientific evaluation	25,000	25,000	---
Categorical clinical research centers	686,000	686,000	---
Total research grants	20,754,000	23,535,000	+2,781,000

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Noncompeting continuations	297	$11,450,000	408	$17,086,000	+111	+$5,636,000
Competing projects	152	6,992,000	92	4,307,000	-60	-2,685,000
Supplementals	(2)	50,000	(2)	50,000	--	---
Subtotal, regular program	449	18,492,000	500	21,443,000	+51	+2,951,000
General research support grants		1,551,000		1,381,000		-170,000
Scientific evaluation		25,000		25,000		---
Categorical clinical research centers		686,000		686,000		---
Total, research grants		20,754,000		23,535,000		+2,781,000

Fellowships

	1971	1972	Increase or Decrease
Total fellowships........	$1,676,000	$876,000	-$800,000

The fellowships program of the National Eye Institute is directed toward increasing the number of individuals engaged in research and academic careers in the visual sciences. The program emphasizes the training of individuals already knowledgeable in the basic sciences related to vision research. Postdoctoral fellowships provide support for one to three years of training to individuals who have already earned a doctoral degree, but who have had little or no research experience. Special fellowships are awarded to more experienced individuals who find it highly productive to spend a year or two in research laboratories other than their own. Research career development awards are made to investigators of demonstrated ability who require several years of additional experience in order to develop a capability for independent investigation.

The budget request for 1972 will provide for approximately 52 fellowship awards of all types, a decrease of 71 awards.

Fellowship Program Analysis

	1971 Estimate	1972 Estimate	Increase or Decrease
Retinal and choroidal disorders..	$ 687,000	$420,000	-$267,000
Disorders of the visual system...	436,000	175,000	-261,000
Refractive anomalies............	251,000	88,000	-163,000
Developmental defects...........	218,000	149,000	-69,000
Glaucoma........................	84,000	44,000	-40,000
Total.......................	1,676,000	876,000	-800,000

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting.....	18	$427,000	14	$410,000	-4	-$17,000
Competing........	7	82,000	5	52,000	-2	-30,000
New..............	98	1,167,000	33	414,000	-65	-753,000
Total.........	123	1,676,000	52	876,000	-71	-800,000

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Postdoctoral........	35	$ 330,000	18	$170,000	-17	-$160,000
Special.............	63	723,000	10	108,000	-53	-615,000
Research career development.......	24	591,000	23	566,000	-1	-25,000
Research career.....	1	32,000	1	32,000	---	---
Total..........	123	1,676,000	52	876,000	-71	-800,000

Training Grants

	1971	1972	Increase or Decrease
Total training grants........	$2,225,000	$2,225,000	---

Training grants supported by the National Eye Institute are awarded to institutions for establishing, improving, or expanding graduate training programs to prepare individuals for research and academic careers in the visual sciences. In 1971 and 1972 emphasis will be placed on advanced training linked to the objective of providing medical schools with full-time personnel for coordinating and conducting programs in investigative ophthalmology. These programs will produce scientists to develop the knowledge essential for improving the prevention and treatment of eye disorders and for training the next generation of investigators in vision research.

Funds for this program remain constant for 1971 and 1972. In the face of increasing costs for training, the number of grants will decrease from 47 in 1971 to 42 in 1972.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations:						
Noncompeting.......	42	$1,958,000	31	$1,568,000	-11	-$390,000
Competing..........	4	195,000	10	567,000	+6	+390,000
New.................	1	47,000	1	65,000	--	---
Scientific evaluation	(1)	25,000	(1)	25,000	--	---
Total..........	47	2,225,000	42	2,225,000	-5	---

Training Grants (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Graduate...............	47	$2,200,000	42	$2,200,000	-5	---
Scientific evaluation..	(1)	25,000	(1)	25,000	--	---
Total............	47	2,225,000	42	2,225,000	-5	---

Laboratory and Clinical Research

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	51	$ 712,000	61	$ 896,000	+10	+$184,000
Other expenses..........	--	2,213,000	--	2,179,000	--	-34,000
Total.............	51	2,925,000	61	3,075,000	+10	+150,000

Funds appropriated for this activity support the NEI intramural research program. The program is comprised of a Laboratory of Vision Research focusing on the basic structure and function of the visual system, and a Clinical Branch focusing on the application of basic knowledge for improved health care and the prevention of visual disorders. The Institute is currently engaged in an intense effort to maintain and further develop a research environment which will provide the physical resources, scientific leadership and administrative management necessary to permit the opportunity for high quality research to be performed and for rapid translation of results to clinical application.

Talented investigators representing a wide variety of scientific disciplines are performing important basic and clinical studies of retinal disease, glaucoma, infectious diseases of the eye, and other physically and economically debilitating visual disorders. These efforts have recently led to significant research advances, demonstrating the need for continuation and strengthening of the intramural program. Through studies of the development of visual tissues in embryos, one investigator has increased our understanding of congenital diseases of the eye and of refractive errors, the most common form of visual impairment. The first description of color vision at the level of a single nerve cell has been accomplished by another investigator, providing much needed information for the understanding of normal and abnormal retinal function. In addition, the possibility of long term and even permanent management of retinal degeneration has been indicated in experiments which have resulted in the reversal of a degenerative disease of the retina. Another Institute scientist, in collaboration with investigators from the National Institute of Arthritis and Metabolic Diseases, has developed a simple technique for the biochemical diagnosis of cystinosis, a hereditary disorder. The discovery by another investigator that a certain drug can increase the rate of aqueous humor formation has advanced the Institute's research on glaucoma.

In terms of organization and program context, the intramural program has been strengthened by the appointment of a Clinical Director; the centralization of technical and administrative support and the appointment of an administrative officer; the establishment of a new eye clinic in the NIH Clinical Center, and major renovations and equipment purchases for new laboratory facilities.

In addition, the Institute is currently exploring a plan to intensify its clinical research program at reduced cost by renting nearby housing facilities to maintain patients whose condition does not require bed care. Expenses under this arrangement would include the cost of rented facilities, and travel and subsistence for patients and a parent or guardian. These patients are needed if research is to go forward to the fullest extent within the capabilities of NEI staff and the facilities of the Clinical Center.

Program Plans 1972

In 1972 additional laboratory facilities now under renovation will be available for the expansion of intramural research programs. These facilities will permit the Institute to undertake a major expansion of efforts in the anatomical, physiological, and biochemical investigation of the visual system through the extension and exploitation of such recent advances as were previously mentioned. Implementation of this program will require increased capabilities in biochemistry, neurophysiology, and electronmicroscopy. In addition, technical personnel are required to provide the necessary support to attract competent senior investigators in these areas.

The budget request of $3,075,000 for 1972 includes an increase of 10 new positions to permit implementation of these plans. The requested positions will be financed through a reduction of equipment expenditures and the utilization of funds budgeted in 1971 to equip the newly assigned laboratory space. Also included are increases of $42,000 for annualization of 1971 pay increase costs, $34,000 for the annualization of positions new in 1971, $12,000 for within-grade salary advances, $2,000 for an extra-day pay costs, and $60,000 for the National Institutes of Health management fund for centrally furnished services.

Collaborative Research and Development

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	--	---	--	---	--	---
Other expenses........	--	$1,332,000	--	$1,332,000	--	---
Total...........	--	1,332,000	--	1,332,000	--	---

This activity provides support for research and development contracts with universities, non-profit research laboratories, or industrial concerns in areas where there is promise of improving and accelerating the application of knowledge and technology to the management of diseases of the visual system. The Institute is currently emphasizing those areas which will extend and compliment the intramural research effort through the support of NEI staff-directed projects aimed at basic improvements in current methodologies and techniques utilized for research, diagnosis and health care and prevention systems.

In 1972 the Institute will use funds appropriated for this activity to implement a major new effort to exploit opportunities for significant advances in the areas of corneal and retinal diseases and glaucoma. Efforts in such areas as the development of artificial tears, laser "spot welding" of the retina, and the development of new microsurgical techniques offer the possibility of rapid payoff and a significantly improved capability in the treatment of these visual disorders. Development of new examination methods for retinal disorders through advances in bioengineering and instrumentation, development of animal models for retinal disease, combination drug therapy of glaucoma, and purification of ocular tissue fractions are other areas which will be considered for funding.

The budget request of $1,332,000 will provide the same level of support as in 1971.

Biometry, Epidemiology and Field Studies

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	15	$218,000	15	$230,000	--	+$12,000
Other expenses........	--	151,000	--	155,000	--	+4,000
Total...........	15	369,000	15	385,000	--	+16,000

This activity provides support for studies on the incidence and prevalence of visual disorders, the application of statistical techniques to analyses of the distribution and natural history of visual disorders among selected population groups, and consultation to Institute staff on mathematical and statistical matters, data processing, and computer technology.

In 1972, efforts toward defining the extent of visual problems by disease category will be continued and strengthened through collaboration with the National Health Survey. Through analysis of data on twins collected by the NEI and others, an effort will be undertaken to rank the major eye diseases as to which are more associated with heredity and which are more associated with environmental factors. If one or more of the major eye diseases is found to be importantly related to environmental factors, the program will then concentrate epidemiologic studies in that direction with emphasis on variations in geographic prevalence and identification of factors associated with high prevalence within individual geographic areas.

The budget request of $385,000 includes increases of $8,000 for annualization of 1971 pay increase costs, $1,000 for one extra day of pay costs, $3,000 for within-grade salary increases, and $4,000 for the National Institutes of Health Management Fund for centrally furnished services.

Review and Approval

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	24	$349,000	24	$382,000	--	+$33,000
Other expenses........	--	420,000	--	439,000	--	+19,000
Total...........	24	769,000	24	821,000	--	+52,000

Funds requested for this activity will provide support for professional and technical staff responsible for the administration of the Institute's research and training grant programs. Responsibilities of staff associated with this activity include routine processing of grant applications and the preparation of recommendations and analyses of grant programs for consideration by the Director and the National Advisory Eye Council.

The budget request of $821,000 includes increases of $26,000 for annualization of 1971 pay increase costs, $2,000 for one extra day of pay costs, $5,000 for within-grade salary increases, $18,000 for the National Institutes of Health Management Fund for centrally furnished services, and $1,000 for increased costs of using the Federal Telecommunications System.

Program Direction

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	13	$254,000	13	$285,000	--	+$31,000
Other expenses........	--	101,000	--	105,000	--	+4,000
Total...........	13	355,000	13	390,000	--	+35,000

This activity provides for the overall administration and direction of Institute programs. The Director and his staff provide professional leadership and technical guidance to the varied activities of the Institute.

In 1972 the Institute plans to promote its capability for effective program management through further training of personnel and centralization of administrative services.

The budget request of $390,000 includes an increase of $9,000 for annualization of 1971 pay increase costs, $1,000 for one extra day's pay costs, $18,000 for annualization of positions new in 1971, $3,000 for within-grade salary increases, and $4,000 for the NIH Management fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research Grants (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$20,754,000	Indefinite	--	$23,535,000

Purpose: The research grants program of the National Eye Institute supports research on the cause, natural history, prevention, diagnosis, and treatment of disorders of the eye and visual system to increase the knowledge necessary to solve vision and vision-related problems of mankind.

Explanation: The Institute sponsors over 400 research grant projects at universities, hospitals, research institutions, and other private or non-profit institutions. Projects vary from the activities of an individual scientist to broadly-based programs that integrate the effort of groups of investigators in a variety of scientific disciplines.

Accomplishments in 1971: In 1971 the National Eye Institute supported approximately 449 research grants in a concerted effort to increase knowledge on many fronts in the field of vision research. Institute grantees added important basic knowledge to our understanding of the visual system, and have developed new diagnostic and therapeutic techniques to enhance the prevention and control of retinal disorders, glaucoma, cataract, and other disabling conditions of the eye and visual system.

Objectives for 1972: In 1972 the Institute will continue to support essential ongoing research funded under this activity and will award approximately 92 competing grants to outstanding investigators in the field of vision research. Areas to be emphasized include glaucoma, diseases of the retina and cornea, and oculomotor disorders.

Activity: Training Grants (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$2,225,000	Indefinite	--	$2,225,000

Purpose: Training grants provide support to academic institutions for the establishment, improvement or expansion of training programs to prepare scientists for research and academic careers in the field of vision research.

Explanation: Support for this activity is funded through the grant mechanism, under the direction of the National Eye Institute extramural staff.

Accomplishments in 1971: In 1971 approximately 47 grants in the amount of $2,225,000 were awarded to institutions to train research investigators in the area of vision and visual disorders.

Objectives for 1972: The budget request for 1972 will provide for the support of an estimated 42 training grants, representing approximately 215 full-time equivalent trainees. Training programs are linked to the objective of providing medical schools with advanced personnel to conduct programs in investigative ophthalmology.

Activity: Fellowships (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$1,676,000	Indefinite	--	$876,000

Purpose: The National Eye Institute fellowship program supports the national vision research effort through the provision of advanced research training in sciences related to the eye and the visual system.

Explanation: The program sponsors advanced research training for individuals whose career development extends from the immediate postdoctoral period through advanced stages of research attainment. Awards are made to individuals in the form of postdoctoral fellowships, special fellowships, research career development awards, and research career awards.

Accomplishments in 1971: In 1971 approximately 123 fellowships in the amount of $1,676,000 were awarded, improving the nation's vision research capability in the fields of anatomy, neuro-ophthalmology, physiology, optics, and ophthalmic pathology.

Objectives for 1972: The estimate for 1972 will provide for approximately 52 fellowship awards, a decrease of 71 awards from 1971.

Activity: Laboratory and Clinical Research (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
51	$2,925,000	Indefinite	61	$3,075,000

Purpose: This activity encompasses the in-house laboratory and clinical research program conducted by staff of the National Eye Institute. The program supports integrated laboratory and clinical studies related to the causation, diagnosis, therapy and prevention of retinal disease, glaucoma, cataracts, and other visual disorders.

Explanation: Approximately 50 professional and technical personnel are supported in this activity. Funds are provided for equipping and operating modern facilities for scientific research, including support for clinical studies utilizing outpatient facilities and 26 beds in the NIH Clinical Center.

Accomplishments in 1971: In 1971 a new eye clinic was established in the NIH Clinical Center, a laboratory of vision research and clinical branch based on the ophthalmology program transferred from NINDS in 1970 was established, and scientific and technical support services were centralized under an administrative officer. Significant scientific advances were made in the areas of hereditary disease, immunology, glaucoma, and retinal disease.

Objectives for 1972: Additional laboratory facilities currently under renovation will permit the Institute to undertake a more extensive effort in the anatomical, physiological, and biochemical investigation of the visual system. Particular emphasis will be placed on investigations of the retina.

Activity: Collaborative Research and Development (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$1,332,000	Indefinite	--	$1,332,000

Purpose: This activity supports the Institute's targeted research and development program on the prevention, diagnosis and treatment of visual disorders.

Explanation: Research and development supported by this activity is funded through contracts and performed in collaboration with other federal agencies, universities, non-profit laboratories, and industrial concerns.

Accomplishments in 1971: In 1971 the Institute continued its support of efforts to improve diagnostic techniques and to evaluate the need for vision manpower. In addition, Institute staff initiated programs to improve the scientific basis for visual care, particularly in instrumentation technology and examination procedures aimed at early detection and prevention of visual disorders.

Objectives for 1972: In 1972 the Institute will use funds appropriated for this activity to maintain its targeted research emphasis initiated in 1971 and implement a major new collaborative effort in the areas of corneal and retinal disease and glaucoma.

Activity: Biometry, Epidemiology and Field Studies (Public Health Service Act, Title IV, Part F)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
15	$369,000	Indefinite	15	$385,000

Purpose: This activity constitutes a program for the collection, analysis and dissemination of statistical data on visual disorders in selected population groups.

Explanation: Support is provided for the Office of Biometry and Epidemiology. The Office is staffed by 15 professional and technical personnel responsible for the design and performance of mathematical and statistical studies on the incidence and prevalence of visual disorders.

Accomplishments in 1971: With the appointment of the Chief, Office of Biometry and Epidemiology, this activity has been strengthened to provide biostatistical consultation for in-house and extramural programs on a continuing basis. Selected population groups have been studied to determine the role of inheritance, age and other factors of potential significance to the etiology of glaucoma, myopia, and other visual disorders.

Objectives in 1972: During 1972 the Office of Biometry and Epidemiology plans to implement clinical field studies to further investigate environmental and genetic factors related to the occurrence of ocular disease, including evaluation of possible therapeutic and preventive measures.

Activity: Review and Approval (Public Health Service Act, Title IV, Part F)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
24	$769,000	Indefinite	24	$821,000

Purpose: This activity provides scientific and administrative direction for all grant supported research and training programs of the National Eye Institute.

Explanation: Support is provided for a staff of 24 professional and administrative personnel to evaluate and administer the extramural programs of the Institute. Positions receiving support include Health Scientist Administrators, Grants Management Specialists, and related clerical personnel.

Accomplishments in 1971: During 1971 the review and approval function continued to meet Institute needs for leadership of extramural visual research programs.

Objectives for 1972: During 1972 the Institute will continue its efforts to enhance the availability of needed information on grant programs. Specifically, the Institute plans to develop an improved information system to meet the needs of scientific and administrative personnel responsible for monitoring and and evaluating extramural programs.

Activity: Program Direction (Public Health Service Act, Title IV, Part F)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
13	$355,000	Indefinite	13	$390,000

Purpose: This activity provides support for the Institute Director and his immediate staff.

Explanation: Funds are made available for the Institute Director and personnel assigned to his immediate office to provide overall scientific and administrative direction of Institute programs. Positions supported include Director, Executive Officer, Budget Officer, and associated clerical and administrative staff.

Accomplishments in 1971: The National Eye Institute became operational with the appointment of its Director in January of 1970. Under his leadership in 1971 the administrative structure of the Institute was strengthened to provide service and support for the in-house and extramural vision-research programs of the Institute. Several important administrative positions were filled to provide a more effective capability for management of these programs.

Objectives for 1972: During 1972 the Office of the Director will continue to function as the focal point for providing direction and coordination to Institute programs.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Laboratory and Clinical Research			
Clinical Ophthalmologist......	GS-14	1	$ 20,815
Physiologist..................	GS-13	1	17,761
Biochemist....................	GS-13	1	17,761
Electronmicroscopist..........	GS-12	1	15,040
Technician....................	GS-9	3	31,410
Administrative Assistant......	GS-7	1	8,582
Clerk Typist..................	GS-5	2	13,876
Total, new positions......................		10	125,245

NATIONAL EYE INSTITUTE

STATEMENT OF DR. CARL KUPFER, DIRECTOR
ACCOMPANIED BY JAMES G. HILL

INSTITUTE MISSION

Senator COTTON. The subcommittee will come to order. The chairman will be here shortly. We will continue now with the National Eye Institute, Dr. Kupfer.

Dr. KUPFER. Senator Cotton, it is a pleasure to be back here again. This is my second appearance representing the Eye Institute, which, as you know, is the youngest institute at the National Institutes of Health.

I am very happy to report some of the changes that took place last year. The National Eye Institute has as its mission the prevention, diagnosis, and treatment of blinding eye disorders and diseases of the visual system.

In the last 2 years we have rapidly become the Federal focus for vision research and in the past year we have been able to create the basis for a fully functioning independent program.

I would like to highlight some of the organizational changes which have taken place in the last year and follow up with some of the research activities.

INTRAMURAL RESEARCH PROGRAM

The intramural research program, both clinical and laboratory research, is rapidly becoming a national resource for vision research at the Bethesda campus as a result of the increased appropriations last year. Space has become available, renovation has taken place, recruitment is proceeding very rapidly. Hopefully in this fiscal year there will be an expanded laboratory facility.

In addition, there has been an expansion of the clinical research program through the construction of a new out-patient department for eye patients as well as a vision care program in which patients not requiring hospitalization can be brought to the Bethesda campus and housed in nearby facilities while their eye problems are kept under very close watch.

EYE CLINIC AND VISION CARE PROGRAM

Though the new eye clinic and the vision care program, our clinical research has been expanded, particularly in the area of glaucoma research.

RETINAL DISEASE AND GLAUCOMA

In addition, through the congressional increase in funds that was made available last year, we have been able to begin a collaborative program using the contract mechanism and are at present actively supporting a number of projects in the development of new diagnostic techniques in retinal disease as well as the development of new drugs for the treatment of glaucoma.

ESTABLISHMENT OF OFFICE OF BIOMETRY AND EPIDEMIOLOGY

Finally, we have been able to establish an office of biometry and epidemiology and are beginning to look at some of the diseases where an epidemiological approach is primarily needed. A good example of this is the effect that diabetes has on the eye, referred to as diabetic retinopathy. This is becoming one of our major public health problems.

RETINAL DISEASE DIAGNOSIS

In regard to extramural research, during the past year a number of our grantees have increasingly used a new technique in the diagnosis of retinal disease employing a rather simple technique which now enables us to directly visualize the flow of blood in the blood vessels of the retina. The ability to diagnose retinal disease has been enhanced considerably through this work.

"DRY EYE" DISEASE

In addition, we continue to support research on soft contact lenses for the treatment of disease of the cornea, the so-called dry eye disease in which there is a deficit of tears. This represents a major cause of not only decreased vision but of eye pain and discomfort.

DIABETIC RETINOPATHY

Research in diabetic retinopathy has been increased. We have initiated a cooperative study among 10 institutions to test some of the current forms of therapy for this serious condition.

GLAUCOMA

Finally, research activity in the early detection of patients who have a high risk in glaucoma is proceeding.

In summary, I would say that we have begun with a rather accelerated growth rate and we hope to maintain the momentum in fiscal year 1972.

(The prepared statement follows:)

I am pleased to be here today to discuss the progress that has been made by the National Eye Institute and to present our plans and needs for the coming fiscal year.

I am glad to report that since I last appeared before you, the Institute has become the Federal focus for research on vision and visual disorders. We have been able to create the basis for a fully functioning Independent program of vision research, as envisioned by the Congress in its passage of The National Eye Institute Act.

Most important, the past year has been marked by significant and exciting advances in research, most notably in the field of diseases of the retina, the eye tissue that converts light to nervous impulses which are transmitted to the brain and allow us to see.

Diseases of the retina and its connections with the brain account for 40 percent of all blindness in the United States and an untold amount of disability short of blindness. Because many retinal disorders are increasing at a rate faster than the increase in the general population, this area presents one of the greatest challenges to vision research.

A diagnostic technique—fluorescein angiography—which has been largely responsible for many recent advances in retinal study, was developed primarily by various Institute grantees. It involves the intravenous injection of a fluorescent dye and permits direct viewing of blood flow within the vessels of the retina and underlying choroid by the examining physician. It has now become a basic tool in diagnosis and in research on retinal diseases and is responsible for much of the progress being made in this area today.

Blindness associated with diabetes accounts for almost 15 percent of new cases of adult blindness. The principal structure involved is the retina where a condition called diabetic retinopathy develops. An estimated 75 percent of all people with diabetes for 15 years or more will suffer some degree of retinopathy.

As planned last year, the Institute has begun supporting a cooperative study, involving the pooling of patient results in a unified research plan, to determine the effectiveness of treating this disease.

Research on other visual diseases is also progressing. What promises to be a major new therapy in treating certain kinds of corneal disease is under development by NEI grantees using contact lenses made of a soft porous plastic. The medical use of these lenses includes the treatment of a serious chronic condition, called "dry eye", a lack of tears which may result from a number of conditions and which can lead to scarring of the cornea and blindness.

In glaucoma research, studies employing fluorescein angiography have strongly suggested that it is the vessels of the choroid and not the retina which are first affected by increased intraocular pressure. Therefore, the direction of research is shifting in the search for the cause of visual loss from this disorder. Another finding is that the number of young patients with this potentially blinding condition is greater than previously suspected.

Surgical improvements in removing cataracts and in corneal transplantation have led to a shortening of the required hospital stay following these operations.

With the increases provided in last year's appropriation, we have been able to continue strengthening our intramural program, working toward its development into a national resource for vision research.

In addition to its 26 beds in the NIH Clinical Center, the Institute has been able to expand its clinical research at a substantially reduced cost by housing patients who do not require bed care in rented facilities off the Bethesda campus.

Our newly completed Eye Clinic has recently opened and has enabled us to intensify research activities in glaucoma and retinal diseases, conditions which do not usually require patients to be hospitalized.

A major organizational development during the past year was the creation of an Office of Biometry and Epidemiology. The Office is now the focal point in the Institute for conducting important statistical and epidemiological studies on the extent of eye disease, factors related to disease occurrence and clinical trials of new treatments.

The summary budget request for the National Eye Institute is $32,639,000 for 1972, compared with an operating level of $30,405,000 in 1971.

I shall be happy to answer any questions.

SUBMISSION OF BUDGET TO OMB PRIOR TO 1971 CONGRESSIONAL INCREASE AND OMB APPROVAL OF INCREASE AND PROVISION OF LIKE AMOUNT FOR 1972

Senator Cotton. The Eye Institute is comparatively new.

Dr. Kupfer. Yes, sir. We are just entering our third year.

Senator Cotton. I notice you are exceptionally fortunate in that you must have impressed the Bureau of the Budget because you are one institute that the Office of Management and Budget increased your appropriations over the estimate of the department, and over last year.

Mr. Miller. Senator, this table is rather deceptive. The reason is that we submitted our budget to the Office of Management and Budget before Congress finished appropriating the funds for 1971.

What really happened is that OMB permitted us to spend the congressional increase in this Institute. Because we spent the 1971 increase, they put enough money in 1972 to keep the budget level or slightly above.

Senator Cotton. I am not quite sure that I understand you.

Mr. Miller. At the time that we submitted our request for funds to the Office of Management and Budget for fiscal year 1972, Congress had not yet acted on our 1971 appropriations. But since the final appropriation was higher, OMB made an upward adjustment to our estimate for 1972—in order not to have a reduction in the program level for 1972.

Senator COTTON. Did you spend more than $30,406,000 in fiscal 1971?

Mr. MILLER. No. If you look back in the history table, I think you would see that the 1971 level, at the time we made our request, was considerably less than $30,406,000 because the Congress had not yet acted, although our final obligational level for 1971 was $30,406,000.

Senator COTTON. But the budget calls for $32,639,000 for 1972.

Mr. MILLER. That is right.

In essence, OMB kept the same increase, 1972 over 1971, as we had originally requested on the basis of the House action. They made the 1972 budget expand at the same rate that we requested but the base was at a higher level for fiscal year 1971 because Congress' final appropriation was higher than the House allowance.

Senator COTTON. Senator Magnuson, I guess you had better take over because I can't quite get through my head what has been going on. We are on the Eye Institute. This indicates that in fiscal 1971 it is $30,406,000. The estimate of the department for 1972 is $31,862,000. The department estimate was $30.250,000. The budget calls for $32.639,000, which is an increase of $2,389,000 and our friend, the budget officer over there, is trying to explain to me so that I understand that it is not an increase.

Mr. MILLER. And I have not been successful.

Senator COTTON. It is not clear to me yet.

Will you go through your song and dance again? You are over my head completely.

RELATIONSHIP OF 1972 REQUEST TO 1971 APPROPRIATION

Mr. MILLER. I will try one more time, but I suspect we are taking time away from the director's program. I will make it as brief as I can.

At the time that we submitted the 1972 budget to the Office of Management and Budget, the House had acted on the 1971 appropriation but the Senate had not and there was no final appropriation. Our 1972 figures were therefore based on a lower 1971 level of predicted appropriation than actually finally occurred. When Congress completed the 1971 appropriation, OMB decided for this Institute we would spend all the money that the Congress had appropriated and, in addition, that we would make sure that we maintained the same level of increase for these programs as had originally been requested by the Department on the basis of the lower fiscal year 1971 level.

So, they let us spend all the 1971 money. They put enough money in the 1972 budget to maintain the same rate of increase. So, the history table shows an OMB increase but in a sense they were simply maintaining the same rate of program growth that we had originally requested.

This shows up in this fashion for several of the Institutes. We made the same point with respect to the Heart Institute yesterday.

Senator MAGNUSON. How much did you spend last year?

Mr. MILLER. In fiscal year 1971?

Senator MAGNUSON. Yes.

Mr. MILLER. $30,406,000.

Senator MAGNUSON. You are asking for $32.6 now?

Mr. MILLER. That is right.

Senator MAGNUSON. That is $2.2 million more, isn't it?

Mr. MILLER. That is right.

Senator COTTON. It is an increase, then?

Mr. MILLER. I am not saying it is not an increase. I am saying the Department did not cut this budget and have OMB come along and say "You should have more money, we will put more money in." That is not the way it occurred.

Dr. KUPFER. I am available for questions.

NONCOMPETING GRANT COMMITMENTS

Senator COTTON. He has concluded his statement. I was about to ask how the increase was going to be used and my friend over there, I thought, was trying to explain to me that there wasn't any increase.

Senator MAGNUSON. How is it going to be used?

Dr. KUPFER. The bulk of the increase will be used to honor the commitments in the noncompeting grant area that Dr. Marston has mentioned previously.

ADMINISTRATIVE COSTS

The remainder of the increase will be used for increased administrative overhead costs.

PERSONNEL

Senator MAGNUSON. When speaking of personnel we don't have a figure, put in the record some place how many people you have on board.

Dr. MARSTON. All right, sir.

May I comment on the personnel?

Senator MAGNUSON. The whole shebang. Break it down, people that we pay for. If we pay a salary some place count that in, too. You can do that. What will be the estimate?

Dr. MARSTON. It is about 11,000 people, roughly.

Senator MAGNUSON. Break it down. For instance, how many would be in the Eye Institute.

Dr. KUPFER. 103.

Dr. MARSTON. 11,886 are what we are requesting for 1972. This is compared to the 11,613 in 1971.

Senator MAGNUSON. Is that all who are here?

Dr. MARSTON. This is all who are on our payroll.

Senator MAGNUSON. Field, research, every place?

Dr. MARSTON. Yes, sir.

Mr. MILLER. Did you include the grants and contracts?

Dr. MARSTON. No.

Mr. MILLER. Usually when the chairman asks this question, he wants to know how many people all your moneys pay for, grants and contracts.

Dr. MARSTON. That requires, as in previous years, some estimates.

Senator MAGNUSON. If you pay half the salary out in the field, why two of those equals one.

Senator COTTON. The actual new positions are how many?

Dr. MARSTON. 273 for NIH as a whole—Federal employees.

Senator COTTON. You have some for the expansion of the cancer activity.

Dr. MARSTON. Yes, sir. Some of the Institutes have no increases. Essentially, they are tied to the dollar increases that have been justified Institute by Institute.

I might say that one of the special problems of an Institute, such as the Eye Institute, that is just getting started is the very serious restraints that we have had on positions in the Federal Government. This has been a major problem at NIH in recent years.

(The number of employees supported by NIH funds and 1971 estimated NIH strength follows:)

July 29, 1971
Insert pg. 2396A

National Institutes of Health

Numbers of Federal and Non-Federal Employees Supported from NIH Funds

Estimated On-Board Strength - Fiscal Year 1971

	NIH (Actual Strength)	State and Local Government (Estimate)	Universities (Estimate)	Non-Profit Research Institutes (Estimate)	Private Contractors (Estimate)	Other (Estimate)	Estimated Total
DBS............	264	18	33	--	25	--	340
NCI............	1,426	186	5,392	1,881	1,714	150	10,749
NHLI...........	584	182	7,219	1,413	526	469	10,393
NIDR...........	289	30	813	154	28	23	1,337
NIAMD..........	597	246	6,935	1,388	96	185	9,447
NINDS..........	583	196	5,732	1,119	166	168	7,964
NIAID..........	665	167	4,371	837	65	113	6,218
NIGMS..........	164	144	4,378	765	46	138	5,635
NICHD..........	435	102	2,857	702	323	80	4,499
NIEHS..........	220	8	484	24	1	--	737
NEI............	92	56	1,503	288	--	39	1,978
OD.............	481	--	--	--	2	8	491
FIC............	47	--	--	--	--	--	47
RR (incl. GRSG).	83	773	4,003	637	9	324	5,829
NLM............	462	12	299	26	80	91	970
HM.............	737	27	6,600	55	63	32	7,514
NIH Management Fund..........	4,123	--	--	--	--	--	4,123
Total........	11,252	2,147	50,619	9,289	3,144	1,820	78,271

This tabulation provides an estimate of on-board Federal and non-Federal employment supported by National Institutes of Health funds in fiscal year 1971. Non-Federal employment is financed from NIH grants and contract awards. It cannot be emphasized too strongly that the figures for the non-Federal portions are a very rough estimate of employment by grantees and prime contractors. For the most part, the NIH Institutes do not keep records of non-Federal employment supported by their grants and contracts. Consequently, the tabulation is based on the informed estimates of NIH program managers, which have been derived from assumptions as to man-year equivalents, and cannot be supported by detailed reports. NIH funds normally pay only a portion of the person's salary employed on grant or contract. The tabulation, therefore, attempts to give a picture of the overall effort rather than total number of people supported from NIH funds. Bearing this qualification in mind, the tabulation does provide a reasonably accurate picture of the overall level and distribution of non-Federal employment supported by NIH programs. The Federal employment portion, however, does reflect NIH's actual on-board strength as of June 30, 1971.

RESEARCH GRANTS

Senator MAGNUSON. How much research grants are you funding for 1972?

Dr. KUPFER. Approximately 500, I believe.

UNFUNDED GRANTS

Senator MAGNUSON. Put in the record how many unfunded grants you have, approved but unfunded.

Dr. KUPFER. Yes, sir.

(The information follows:)

NATIONAL EYE INSTITUTE

RESEARCH GRANTS—REGULAR PROGRAM UNFUNDED APPROVALS

[Amounts in thousands of dollars]

	1971		1972	
	Number	Amount	Number	Amount
Funded	449	18,492	500	21,443
Unfunded	56	2,263	130	6,110

FELLOWSHIPS

Senator MAGNUSON. Have you cut the fellowships?

Dr. KUPFER. Well, sir, in 1971 we did receive an increase through the congressional changes for fellowships. That would be reduced in 1972.

Senator MAGNUSON. How many?

Dr. KUPFER. $800,000 which represents perhaps 71 fellowships. There will be 71 less than in 1971.

Senator MAGNUSON. 71 less?

Dr. KUPFER. Yes, sir.

Senator MAGNUSON. Why are you cutting that down? Maybe I should ask, do you want to cut it down?

Dr. KUPFER. Well, sir, I think in a field such as vision research which has grown very rapidly and is expanding it would be very desirable to have money available for fellowships.

Senator MAGNUSON. Would you say at least to last year's level?

Dr. KUPFER. Yes, sir.

VISION-DIABETES RELATIONSHIP

Senator MAGNUSON. Now, there has been some testimony that vision and diabetes have something in common. Do you know about that research?

Dr. KUPFER. Yes, sir.

Senator MAGNUSON. Will you tell us about that?

Dr. KUPFER. I think the most significant relationship between vision and diabetes is that one of the most serious complications of diabetes is that it affects the retina. This is the seeing part of the eye. This leads to blindness in a significant number of people with diabetes.

Since the development of this eye complication is related to the length of time that the patient has had diabetes it is very apparent that as more diabetics live to an older age the incidence and prevalence of blindness from diabetes is going to be increased. This disease, called diabetic retinopathy, is now the second leading cause of new adult blindness and in another 2 or 3 years it may be the main cause of new adult blindness. This is a very serious problem.

We are looking at it very, very seriously. As a matter of fact, I mentioned just before that we are beginning a cooperative study to assess treatment for this condition.

Senator MAGNUSON. Does that come gradually?

Dr. KUPFER. Yes, sir.

Senator MAGNUSON. It does not happen all of a sudden?

Dr. KUPFER. The development of the complication is gradual but the loss of vision is very often sudden because it may be caused by a hemorrhage inside the eye.

Senator MAGNUSON. Can they detect that now by looking into somebody's eyes?

Dr. KUPFER. Yes, sir; this can be detected.

Senator MAGNUSON. Can an optician detect it?

Dr. KUPFER. Did you say an optician?

Senator MAGNUSON. Yes.

Dr. KUPFER. An optician only grinds lenses. Anyone who can use an ophthalmoscope to look in the eye, an ophthalmologist or an optometrist, could detect the disease.

Senator MAGNUSON. An optometrist? He could tell you if you are having this problem?

Dr. KUPFER. I think he could, yes.

Senator MAGNUSON. I have no further questions.

DETACHED RETINA

Senator COTTON. As a matter of curiosity, and I won't take too much time, is there an increase in detached retinas? It seems to me every time I turn around some friend of mine has a detached retina.

Dr. KUPFER. I think there is an increase in detached retina in this sense, Senator Cotton. Some of the causes of detached retina are related to other situations. For instance, the chances of developing a detached retina after cataract extraction is greater. Therefore, as more people have cataracts removed, living to a longer age, there may be an increased number of cases of detached retina. In that sense, detached retina occurs more frequently now than it did before.

Senator COTTON. Does blood pressure have something to do with it?

Dr. KUPFER. No, sir.

Senator Cotton. We have had two or three Members of Congress, including the Senator from West Virginia, who had detached retinas very recently. I don't think it was preceded by a removal of cataracts.

Dr. Kupfer. There are other conditions. For instance, diabetes will predispose toward detached retina. Any inflammatory disease, such as uveitis, will predispose toward detached retina. In previous years these conditions would just cause blindness. Now, one can control the uveitis, then this opens the possibility of developing detached retina.

Senator Cotton. Thank you.

EYE GLASSES

Senator Magnuson. Is one of the most common causes of the necessity to wear glasses, leaving out these other things, the deterioration of the muscles of the eye?

Dr. Kupfer. No, sir. For an individual to see clearly without needing glasses the light must come to a sharp focus on the retina, the seeing part of the eye. If the eye is too long or too short or the cornea or lens does not bend the rays of light properly one needs some assistance from glasses to focus the light on the retina. That is the main need.

EFFECT OF FATIGUE ON VISION

Senator Magnuson. Does fatigue have something to do with your being able to see well?

Dr. Kupfer. In a way it does.

Senator Magnuson. Toward the end of the day if you work all day. You can usually see a little better in the morning when you first wake up than at the end of the day.

Dr. Kupfer. That is right. The fatigue in the eye is not the eye so much as the muscles that move the eye. The eye muscles get tired just the way other mucles do and the ability to focus is decreased.

UNNECESSARY PRESCRIPTIONS FOR EYE GLASSES

Senator Cotton. A generation ago didn't they used to put glasses on the children when they had no business doing it and caused them to need glasses all their lives?

Dr. Kupfer. I am not sure if there is good data. I think that glasses are unnecessarily prescribed probably much, much less often now than in the past as we have learned more about this situation.

Senator Cotton. When I was a child on the farm, if your mother got the idea you weren't seeing well, or an 18-year-old schoolteacher in the village school said "I don't think he sees well," when, as a matter of fact, the student was just lazy, they would take you to some optometrist. In those days he was a jeweler; and he had one of those cards and he would fiddle around and put glasses on you. I have always believed if they had left me alone I wouldn't have needed glasses.

But this is just imagination, I guess.

Senator Magnuson. Sometimes if you lose them you will find out for a day or two you get along pretty good without them.

Senator Cotton. Not now. If I lose them I feel all around trying to find them.

Senator Magnuson. Thank you very much.

Dr. Kupfer. Thank you, sir.

NATIONAL INSTITUTES OF HEALTH

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

Justifications

Appropriation Estimate

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

To carry out, except as otherwise provided for, sections 301 and 311 of the Public Health Service Act, with respect to environmental health activities, [$20,620,000] *$25,271,000.*

Amounts Available for Obligation

	1971	1972
Appropriation..........................	$20,620,000	$25,271,000
Real transfers to:		
(Proposed transfers for increased pay costs)		
"National Library of Medicine".........	-442,000	
"St. Elizabeths Hospital".............	-27,000	
Comparative transfers to:		
"Health Manpower".....................	-274,000	---
"Office of the Director"..............	-22,000	---
Comparative transfer from:		
"Biologics Standards".................	135,000	---
Total obligations.............	19,990,000	25,271,000

Obligations by Activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase or Decrease Pos.	Increase or Decrease Amount
	Grants:						
169	Research.....	---	$9,480,000	---	$11,918,000	---	+$2,438,000
173	Fellowships..	---	264,000	---	264,000	---	---
175	Training.....	---	2,843,000	---	2,843,000	---	---
	Direct operations:						
177	Laboratory and clinical research...	197	5,530,000	225	7,314,000	+28	+1,784,000
181	Collaborative research and development	---	984,000	---	1,995,000	---	+1,011,000
182	Review and approval of grants..	16	493,000	16	524,000	---	+31,000
183	Program direction..	22	396,000	22	413,000	---	+17,000
Total obligations......		235	19,990,000	263	25,271,000	+28	+5,281,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions....................	235	263	+28
Full-time equivalent of all other positions...............	12	12	---
Average number of all employees....................	214	230	+16
Personnel compensation:			
Permanent positions...........	$2,747,000	$3,126,000	+$379,000
Positions other than permanent..................	62,000	64,000	+2,000
Other personnel compensation..	22,000	40,000	+18,000
Subtotal, personnel compensation............	2,831,000	3,230,000	+399,000
Personnel benefits.............	289,000	327,000	+38,000
Travel and transporation of persons......................	166,000	217,000	+51,000
Transportation of things........	25,000	30,000	+5,000
Rent, communications and utilities....................	512,000	807,000	+295,000
Printing and reproduction.......	25,000	33,000	+8,000
Other services.................	560,000	682,000	+122,000
Project contracts............	984,000	1,995,000	+1,011,000
Payment to NIH Management Fund.....................	593,000	721,000	+128,000
Supplies and materials..........	635,000	927,000	+292,000
Equipment......................	783,000	1,277,000	+494,000
Grants, subsidies and contributions................	12,587,000	15,025,000	+2,438,000
Total obligations by object.....	19,990,000	25,271,000	+5,281,000

Summary of Changes

1971 estimated obligations	$19,990,000
1972 estimated obligations	25,271,000
Net change	+5,281,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase cost	---	---	---	$128,000
2. Annualization of positions authorized in 1971	---	---	---	140,000
3. Within grade pay increases	---	---	---	34,000
4. FTS rate increase	---	---	---	2,000
5. Noncompeting continuation of research grants	---	---	---	757,000
B. Program:				
1. Research grants	---	$9,480,000	---	1,738,000
2. Laboratory and clinical research	197	5,061,000	28	1,400,000
3. Collaborative research and development	---	984,000	---	1,011,000
C. Payment to "National Institutes of Health Management Fund" for centrally furnished services	---	593,000	---	128,000
Total, increases	---	---	28	5,338,000
Decreases:				
A. Program:				
1. Research grants	---	---	---	-3,000
2. General research support grants	---	---	---	-54,000
Total, decreases	---	---	---	-57,000
Total, net change	---	---	28	5,281,000

Explanation of Changes

1. Built-in increases--These increases will provide $128,000 for annualization of the 1971 pay increase cost; $140,000 for the annualization of positions new in 1971; $34,000 for within grade pay increases in 1972; $2,000 for increased cost in 1972 of using the Federal Telecommunications System; and $757,000 to support the increase in noncompeting continuation grant commitments established prior to 1972.

2. Research grants--The requested program increase of $1,738,000 would fund $1,238,000 in additional new and competing renewal grants and $500,000 to initiate a new Environmental Health Sciences Center for a total of 7 centers in 1972. The request also includes a decrease of $54,000 for general research support grant, a program included in each National Institutes of Health appropriation containing research grant projects, but administered separately by the Division of Research Resources, and $3,000 for a non-initiative program decrease.

3. Laboratory and clinical research--The program increase of $1,400,000 and 28 positions would provide continued development of the Institute's intramural program located at the Research Triangle Park, North Carolina. During the last quarter of 1971, an additional 30,000 square feet of space will be ready for occupancy. The additional space with its specialized design will now make possible the initiation of long-delayed high priority programs as well as the more adequate staffing of ongoing programs.

4. Collaborative research and development--An increase of $1,011,000 will finance research support in ongoing programs as well as the initiation of new ones. Some areas of investigation are trace metals toxicology, pesticides, mutagenesis and others.

Authorizing Legislation

Legislation	1972 Authorized	 Appropriation requested
Public Health Service Act of 1944, as amended:		
Section 301 -- Research and Investigation, In General..............................	Indefinite	$25,271,000
Title III, Part A--National Institute of Environmental Health Sciences........	Indefinite	$25,271,000

PUBLIC HEALTH SERVICE ACT

Title III, General Powers and Duties of Public Health Service, Part A, Research and Investigation. --

"Sec. 301. The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification, sewage treatment, and pollution of lakes and streams."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfers to:		
National Library of Medicine	-$442,000	Proposed transfer for increased pay costs
St. Elizabeths Hospital	-27,000	
Comparative transfer to:		
Office of the Director	-22,000	Transfer of research contracting function from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
Health Manpower	-274,000	Transfer of institutional support funds to Health Manpower.
Comparative transfer from:		
Biologics Standards	135,000	To provide an equitable distribution of the Management Fund in 1972.

National Institute of Environmental Health Sciences

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1965	$ 10,920,000	$ 9,380,000	$ 9,730,000	$ 9,380,000
1966	15,933,000	15,933,000	15,983,000	15,983,000
1967	24,312,000	24,298,000	24,298,000	24,298,000
1968	20,615,000	17,289,000	20,615,000	17,289,000
1969	18,099,000	17,541,000	18,099,000	17,820,000
1970	18,328,000	18,328,000	18,328,000	18,328,000
1971	19,843,000	20,620,000	21,620,000	20,620,000
1972	25,271,000			

Justification

National Institute of Environmental Health Sciences

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	235	$3,120,000	263	$3,557,000	+28	+$437,000
Other expenses..........	---	16,870,000	---	21,714,000	---	+4,844,000
Total.................	235	19,990,000	263	25,271,000	+28	+5,281,000

General Statement

Introduction

This will mark the first year that this Institute will have enough research space to permit the establishment of the full range of required laboratory programs although on a limited scale. This will enable exploration of many more of the important questions dealing with the environment. Since the beginning of this Institute in 1966, resources have permitted the initiation of programs in only a few of the many areas which need investigation. The amounts requested for 1972 will permit extention of investigations into the actual and potential effects on human health brought about by a rapidly changing environment. In addition to the intramural research activities, there is an extramural program which includes grants, fellowships, training programs, university-based centers, and research contracts.

Purpose

The National Institute of Environmental Health Sciences was established in response to the need to increase the store of fundamental knowledge and understanding of environmental agents as hazards immediately or ultimately affecting man's health. The results of research are promptly made available to agencies having responsibility for the environmental monitoring, standard setting and control of all of its phases or compartments. The initial approach is to determine the magnitude and significance of the hazard to man's health from long-term exposures to low-level concentrations of chemical, physical, and biological agents in the environment; and second, to elucidate the underlying mechanisms of adverse response with the hope that principles and generalizations will be identified to provide a scientific base for criteria upon which control agencies could set standards for protective and preventive measures.

The direct beneficiaries of the basic knowledge so developed by the Institute are the categorical programs in environmental control, particularly those encompassed by the Environmental Protection Agency -- such as those concerned with air pollution, radiological health, occupational health, environmental sanitation, solid waste management, and food and drugs. Close liaison is maintained with these activities to ensure the inclusion of their requirements in the development and implementation for supporting research in the Institute's program-planning. The American people are the long-range beneficiaries of the Institute's efforts.

Extramural Research and Training

The support of research and training in the environmental sciences through grant-in-aid is an essential component of the national effort to identify, characterize, and ultimately control known and potential hazards in the environment. Training functions continue to develop new and highly-qualified environmental scientists. Fundamental data elicited from studies of environmental hazards and their mechanisms of action provide the basis for new approaches to the resolution of complex and growing problems of environmental contamination. As the fund of knowledge increases and new techniques of monitoring and analysis develop, new bases for realistic control standards may be expected to emerge.

Intramural Research

The National Environmental Health Sciences Center, the intramural program of the National Institute of Environmental Health Sciences, was created for the purpose of investigating at the fundamental level the long-term and subtle effects of environmental agents potentially hazardous to man. These studies are directed to the development of a scientific base for establishing standards and devising remedial measures. This information is a necessary prerequisite to the establishment of generalizations and principles which can be applied to assure protection of exposed populations. The increasing complexity of our environment makes it imperative to view the problems of environmental hazards from the vantage point of total health effects. Complementing experimental laboratory studies, the Center engages in long-term epidemiological studies of populations with unusual environmental experiences or unique morbidity and mortality patterns. In summary, the Center provides a central facility for intramural research and a focal point for a nationwide effort on the total health effects of physical, chemical, and other environmental factors to which the American people are exposed.

The function of the Center is to identify harmful agents in the environment, discover the mechanisms by which they affect an individual's health and develop data on the effects of chronic exposure, thereby providing a scientific base upon which control measures can be developed. The several classes of environmental agents on which research is now being carried out are natural products, metal compounds and chelating agents, reaction products of organic and inorganic compounds, tobacco smoke constituents, polymer dusts, alpha radiation, pesticides and pesticide synergists.

The narrative material which follows provides in greater detail current and planned investigations for support or conduct either through grants or contracts, or in the Institute's own laboratories. The programs of the Institute are discussed here in terms of the mechanisms employed for their support. These programs are viewed and planned as part of a total national program with each component complementary to the others, with all aimed at the understanding of the hazards to health resulting from man's interaction with his environment.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Research projects..........	$5,945,000	$7,937,000	+$1,992,000
Special programs...........	3,535,000	3,981,000	+446,000
Total research grants....	9,480,000	11,918,000	+2,438,000

Introduction

The Institute awards grants to public and private non-profit institutions covering a broad range of research activities in the fields of environmental health. The general purpose of these grant projects is to identify and characterize the sources, modes of entry, and biologic effects of known and suspected noxious agents in the environment. The research varies in scope from studies of toxic mechanisms at the molecular and subcellular levels to epidemiological studies conducted to identify environmental factors in the etiology of human disease. Projects range in magnitude from the circumscribed efforts of individual investigators to broad based integrated program grants employing the expertise of numerous scientists from a variety of scientifc disciplines. Data developed by these research projects will improve our understanding of specific noxious agents as they affect biologic systems and will permit the eventual establishment of realistic control standards; and will provide the basis for predicting the effect of agents newly introduced into the environment. They will provide fundamental knowledge of environmental stressors and their mechanisms of action. New and refined techniques will evolve which will permit and encourage research into fields which are now at the fringes of our capability.

Program Plans for 1971 and 1972

Institute-supported scientists continue to investigate a broad spectrum of known and potential environmental hazards, acting individually and in combination, for their subtle long-range effects on biological function at the fundamental level.

Pesticide studies constitute a large segment of this effort. Much remains to be learned about this broad array of compounds and their specific effects on target and non-target plants and animals. Investigators are identifying sites of action of known pesticides, mechanism of toxicity, changes elicited by their interaction with other chemical and physical agents, and an understanding of the factors controlling their persistence and distribution in the biosphere. These data continue to facilitate the design of new and safer compounds, more efficient in the control of target organisms and less hazardous to human health.

Efforts continue toward the isolation, identification and testing of airborne gases and particulates to determine the toxic effects of chronic low-level exposure to these contaminants. Projects are supported to determine how the molecular and toxic properties of these compounds are altered by interaction with other atmospheric contaminants, by solar radiation, and by weather conditions.

A number of investigators are studying the specific subcellular events leading to pulmonary irritation and disease.

The Institute supports several projects concerned with the toxicity of food contaminants, a number of which have been shown to cause liver cancer in animals. Important among these are the mycotoxins, which are metabolic products of fungi infesting foodstuffs. Cyclamate, saccharin, monosodium glutamate, and other compounds added to foods during their processing and preparation are also under investigation.

Trace amounts of certain metals are essential to health; however, excess amounts of heavy metals are known to disrupt the biologic functions of plants and animals. For certain additional heavy metals no biological need has been demonstrated and these too may be toxic to man. The Institute is supporting several projects to determine the distribution in the environment and the level of exposure of these elements, their metabolism and storage in the body, and the subcellular sites and dynamics of their toxic action.

In addition to the chemical agents under investigation, there is increasing interest in the biological effects of physical stressors in the environment. Research is being supported to measure the effects of ambient temperature and humidity on human heat exchange and temperature regulation. Components of solar radiation are under study for their beneficial and harmful effects on plants and animals. Studies on noise pollution and crowding are being considered to determine the psychophysiologic effects resulting from these urban stresses.

The magnitude of the problem and the demonstrated research opportunities prompt the request for an increase of $1,992.000. This increase will permit the full funding of non-competing grants and an increase of $426,000 and $779,000 in new and competing projects respectively. New projects awarded by the Institute will be in key areas of concern to the Institute, including pesticides, food toxicants, occupational hazards, heavy metals, physical hazards, chemical air pollutants and contaminants of water supply. They will advance the accomplishments of the mission of the Institute, which is focused primarily on determining effects of long-term exposure to low levels of chemical, physical and biological hazards, singly and in combination.

Special Programs

The Institute supports a program of university-based centers designed to concentrate research skills and efforts on the more complex and challenging problems in environmental health. Each of the six currently supported Environmental Health Sciences Centers focuses on areas of primary interest, yet the broad bases on which they operate reflect a concern for the total environment. The interrelationships of these centers greatly enhance their ability to identify and anticipate important problems in environmental health. Among special areas of interest pursued by the centers are: environmental toxicology; biology of natural systems; respiratory disease and aerosol physiology; environmental management; and pesticide biology. Epidemiologic surveys are underway to determine the health hazards of exposure to airborne gases, vapors and dusts. These are being conducted at industrial sites and in the general population. Others are investigating the synergistic effects of ambient temperatures on the toxicity of environmental agents.

In total, these centers serve as a national resource with the Institute serving as a focal point playing a vital coordinating and collaborating role. Each center provides a framework in which a broad spectrum of research can be integrated and brought to bear on problems of environmental health. These centers also provide unique opportunities for graduate training of excellence and advanced in-depth training that is available in few other places.

A most pressing need for the future of environmental health research is the availability of attractive, stable career opportunities. Environmental Health Sciences Centers provide such a setting not only for those already in biomedical research, but also serve to attract promising young investigators into the field. By contrast, in the immediate future, it is unlikely that the traditional pattern of university training will produce a corps of scientists with a primary commitment to environmental health.

Centers cannot effectively embrace more than a few aspects of this broad and complex field. Accordingly, they differ markedly in their orientation and approaches. Individual centers may emphasize areas such as environmental carcinogenesis, natural biological systems, or pesticide biology, but effective utilization of these resources requires the existence of a focus such as the National Environmental Health Sciences Center, that can identify mission-oriented problems, formulate objectives and implement program efforts in a centrally coordinated manner. The Institute provides a problem solving competence in depth to permit evaluation and review, as well as to maintain close working relationships with these external programs. Coordination of the programs of these centers and liaison with them are carried out through a group made up of key Institute staff and the Directors of the individual centers. Semi-annual meetings of this group serve to assure that the individual research projects conducted in these centers are part of a total coordinated national environmental health research program rather than a merely fragmented, although a high quality effort. It is the Institute's position that attainment of the Nation's goals in this important and emerging health area is best assured by this collaborative effort.

An increase of $500,000 is requested to permit the continued development of this program through the initiation of one additional center grant.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting........	63	$4,213,000	67	$4,970,000	+ 4	+$757,000
2. Competing renewals..........	11	430,000	24	1,209,000	+13	+779,000
3. Supplementals.......	(4)	15,000	(10)	45,000	(+6)	+30,000
4. New awards..........	26	1,287,000	34	1,713,000	+8	+426,000
5. Subtotal............	100	5,945,000	125	7,937,000	+25	+1,992,000
6. General research support...........	---	485,000	---	431,000	---	-54,000
7. Environmental Health Sciences Centers..	6	3,050,000	7	3,550,000	+1	+500,000
8. Total research grants	106	9,480,000	132	11,918,000	+26	+2,438,000

Research Grants Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
Pesticides.............	$2,171,000	$2,723,000	+$552,000
Food toxicants.........	605,000	1,334,000	+729,000
Occupational hazards...	398,000	579,000	+181,000
Metals.................	458,000	665,000	+207,000
Physical factors.......	471,000	685,000	+214,000
Air pollutants & smoking	860,000	1,086,000	+226,000
Toxicology, general....	197,000	372,000	+175,000
Multicategorical.......	785,000	493,000	-292,000
Subtotal regular program............	5,945,000	7,937,000	+1,992,000
General research support grants.......	485,000	431,000	-54,000
Environmental Health Sciences Centers.....	3,050,000	3,550,000	+500,000
Total research grants	9,480,000	11,918,000	+2,438,000

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total Fellowships..........	$264,000	$264,000	---

Introduction

The fellowships program is a highly flexible and efficient means for supporting the research training of individuals whose career development extends from the postdoctoral period through the more advanced stages of scientific attainment. The program is competitive at the national level and provides opportunities for full-time study and research training for the best qualified applicants.

Program Plans for 1971 and 1972

During 1971 funds were provided to increase the number of Research Career Development Awards over the previous year. These provide salary support over a five-to-eight-year period for highly selected young scientists who have completed their basic research training and who have displayed outstanding aptitude for research. The awards afford an opportunity for these promising individuals to become established as independent investigators. The effects of air pollutants on the respiratory system constitutes an important part of this program. Some awardees will continue to investigate mucociliary function and other protective mechanisms in the respiratory tract. Others will study early changes in respiratory tissue to determine pathogenetic mechanisms fundamental to the development of chronic lung disease.

Funds requested for 1972 will provide for 18 awards, one less than in 1971.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting........	13	$182,000	13	$210,000	--	+$28,000
2. Competing renewals..	--	---	--	---	--	---
3. Supplementals.......	--	---	--	---	--	---
4. New.................	6	82,000	5	54,000	-1	-28,000
5. Total Fellowships...	19	264,000	18	264,000	-1	0

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Predoctoral........	--	---	--	---	--	---
2. Postdoctoral.......	5	$38,000	4	$31,000	-1	-$7,000
3. Special............	7	88,000	7	94,000	--	+6,000
4. Development awards.	7	138,000	7	139,000	--	+1,000
5. Foreign............	--	---	--	---	--	---
6. Total Fellowships..	19	264,000	18	264,000	-1	0

Fellowships Program Analysis

Fields	1971 Estimate	1972 Estimate	Increase or Decrease
Pesticides............	$45,000	$53,000	+$8,000
Metals................	---	10,000	+10,000
Physical Factors.......	1,000	---	-1,000
Air Pollutants & Smoking	157,000	176,000	+19,000
Toxicology, general....	31,000	24,000	-7,000
Multicategorical.......	30,000	1,000	-29,000
Total.................	264,000	264,000	0

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Training Grants.........	$2,843,000	$2,843,000	---

Introduction

Graduate research training grants are made to institutions to improve and to enlarge the pool of qualified scientists who can engage in research on environmental health. These grants also open competitive opportunities for institutions to strengthen their capabilities for research training in subject areas related to the mission of this Institute.

Program Plans for 1971 and 1972

The funds requested will provide for noncompeting requirements and will allow for the competitive renewal of a substantial number of active programs. Several of these programs emphasize the fundamental aspects of pathobiology and toxicology, including cytogenetic effects in the human. For example, the goal of one program is to train physicians in the strategy and techniques of research in pathobiology, clinical-pathological correlations, and epidemiology of environmental diseases. Another program provides training leading to a Ph.D. in experimental pathology. This training is based upon the premise that medical training is not a prerequisite to the conduct of research in this area of macromolecular pathology. It is anticipated that graduates will be prepared to undertake research projects which are related to environmental health and encompass the tools, techniques, and basic knowledge of pathobiology. One other is devoted to the elucidation of the effects of environmental factors on genetic function and structure as they relate to humans. The goal is the development of geneticists competent to study at the chromosomal level the changes and variability, both physiological and morphological, which result from exposure to environmental agents.

The funds requested for new awards should be sufficient to support new applications which are relevant to the mission of the Institute.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Noncompeting.......	32	$1,812,000	22	$1,904,000	-10	+$92,000
2. Competing renewals.........	5	600,000	8	674,000	+3	+74,000
3. Supplementals......	(1)	25,000	(2)	35,000	+(1)	+10,000
4. New................	4	396,000	3	210,000	-1	-186,000
5. Scientific evaluation.......	1	10,000	1	20,000		+10,000
6. Total.............	42	2,843,000	34	2,843,000	-8	0

Training Grants (by Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Graduate..........	41	$2,833,000	33	$2,823,000	-8	-$10,000
2. Scientific evaluation......	1	10,000	1	20,000	--	+10,000
3. Total training grants.........	42	2,843,000	34	2,843,000	-8	0

Laboratory and Clinical Research

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits............	197	$2,524,000	225	$2,920,000	+28	+$396,000
Other expenses...........	---	3,006,000	---	4,394,000	---	+1,388,000
Total..............	197	5,530,000	225	7,314,000	+28	+1,784,000

Introduction

All of the intramural research units of the National Institute of Environmental Health Sciences, with the exception of the Occupational Studies Group, are located at the National Environmental Health Sciences Center in Research Triangle Park, North Carolina. The Center serves as the focal point of a nationwide collaborative effort for research in environmental health problems.

The interdependence of disciplines and the assured scientific exchange inherent in the problem-solving approach has been a recognized need in the biological sciences. The use of this approach facilitates the full utilization of data from the Center's own research efforts, university-based centers, and the scientific community.

It is the function of the Center to identify harmful agents in the environment, discover the mechanisms by which they affect an individual's health, and develop understanding of the effects of long-term, low-level exposure, thereby providing a scientific base upon which standards can be developed and control measures established.

The classes of environmental agents for which research programs are now underway are the natural products, including a study of fungal toxins, certain trace metal compounds and chelating agents, reaction products of organic and inorganic compounds, tobacco smoke constituents, alpha radiation and pesticides and pesticide synergists. Within each of these areas, several components or products have been selected for study based either on observation of adverse effects in laboratory animals exposed to these chemicals or on epidemiological studies suggesting adverse effects on human populations exposed to these agents in the environment.

Inasmuch as a completely contaminant-free environment will remain technologically unfeasible, major emphasis is directed towards identifying threshold levels below which no adverse effects can be demonstrated or observed responses are reversible and non-cumulative. Similarly, the storage of environmental toxins in various tissues of man and animals (body burden) is an important factor requiring further elucidation. Adverse effects associated with storage of substances in specific organs and tissues must be identified and quantified.

In addition to these ongoing studies, other programs are in various stages of development relating to specific hazards of exposure to asbestos, mercury, and beryllium, for example. Some of these may be more universal and general pollutants than was originally thought. A careful study is made of environmental distribution of various heavy metals leading to contact with man as they occur in the environment, either consumer products or environmental pollutants. This will permit us to be current of new developments which may introduce unanticipated hazards for specific or general population groups. This study of technological trends is directed toward assuring maximum protection at the earliest time possible.

Program Plans in 1971

Toxicologic studies of metabolites produced by fungi growing on fruit, vegetable, or special crops like tobacco are being pursued. The extracts showing toxicity in mice, human tissue culture cells, and bacteria are worked up to isolate the toxic components and to identify them. A new mycotoxin has already been isolated and identified by mycelium of the mold Alternaria tenuis and its toxicity is under further study. This mold is a ubiquitous pest affecting many crops.

Several cell lines have been established in tissue culture which have been used to great advantage in the study of cytotoxicity due to mycotoxins and insecticides as well as for the evaluation of the effects of chlorinated hydrocarbon insecticides on cell replication and subcellular effects on nucleic acid and protein synthesis. These systems have also been utilized to evaluate effects of chelating agents which are likely to present a toxicological problem in the near future. For the evaluation of mutagenic chemicals, tissue culture systems are being used and the mechanism of genetic damage and repair are being explored.

Investigations are underway on malformations resulting from the administration of potentially teratogenic agents to several rodent species with particular emphasis on trace metals, trace metal chelates, and pesticides. Information has been gathered on specific herbicides and their derivatives as required for evaluation and action to be taken by other agencies responsible for the protection of the public. Studies have also been carried out to evaluate interacting factors in the toxicity of environmental agents. The contribution of environmental toxins in modifying teratogenic or other harmful effects are being studied. The mechanism involved depends on the capability of many chemicals and drugs to induce microsomal enzymes which can alter the rate of degradation and elimination of many environmental toxins. Also under study are pesticide synergists which block detoxifying enzyme action and can thus aggrevate the toxicity of pesticides, drugs, hormones, and other compounds of importance.

Analytical chemical studies augment the functional programs of the Center by developing new and improved methods for microquantitation of many environmental toxins. A synthetic chemical laboratory is supplying essential derivatives of environmental toxins to help in their study and identification.

Pathologic studies are concerned with the effect of environmental toxins on the structure and function of many tissues and organs. Studies are carried out at the subcellular, cellular, organ, and intact animal level. Histopathologic evaluation has been extended from the light microscope to the ultra structural level with the help of the electronmicroscope. The Virginia opossum is being developed at the Center as one of the more unusual but highly useful laboratory animals. This marsupial provides a unique biological system by virtue of the migration of the early fetus from uterus to pouch at 13 days gestation. The accessibility of the fetus during the developmental period provides an ideal model for studying fundamental problems of differentiation and organogenesis and allows for the study of environmental agents directly on the developing fetus without interaction with the maternal system. A thorough study is being made of the behavior, reproduction and susceptibility of these animals to various environmental stresses, and techniques are being developed to administer test substances to the fetus without causing any trauma.

The aerotoxicology program is now in the final stages of planning and will be activated at the end of this fiscal year following the completion of the facilities. These new facilities will allow testing of environmental chemicals in order to determine the manner in which they affect organs and tissues following inhalation.

At the time the aerotoxicology program is activated, new modern facilities for animal housing will also be available so that long-range studies involving chronic exposure of animals to environmental toxins can be undertaken. This new facility will considerably enlarge the capability of this Center to adequately house animals for studies of many suspect toxins administered over a long period of time.

Research on the biological effects of physical factors in the environment will initially include ionizing radiation, ultraviolet light, microwaves, and sound. Of a special importance is the dosimetry of non-ionizing radiation fields, that is, a determination of the relationships between field intensities and relevant energy absorption processes and distributions in biological tissues must be related to biological response. Through collaboration with the cell biology program, selected biological tissue and biological end points will be used to compare the relative effectiveness of microwaves, ultraviolet light, x-rays, gamma rays, alpha particles and heat on the basis of quantitative energy absorption measurements and basic interaction mechanisms. Such studies are a first step towards the development of generalized dose-response models having predictive value. The development of novel dose concepts and parametric descriptions which can relate damage mechanisms to physical and biological properties of the insult and the damaged entity is the long-term goal.

Statistical design and analysis of experiments are provided for Institute personnel engaged in laboratory research and human population studies. The purpose of this support is to obtain more significant and relevant results from multifactorial animal and human studies through the use of effective collection of data and subsequent analysis. Based on the theory and techniques of mathematical and analytical statistics and experimental design, this is accomplished by independent and cooperative research studies on the biological effects of environmental agents and their interactions with one another. Statistical services are provided to other agencies in the review of research projects related to environmental health.

The scientific information program provides scientific liaison with categorical environmental health programs to maintain mutual awareness of relevant scientific and technical activities. A system for quick retrieval of information on scientific topics relevant to the Institute's programs is being developed. Reviews of important topics are developed and issued as needed (coal workers pneumoconiosis; nitrates and nitrites, and methemoglobinemia in 1970).

Program Plans in 1972

During 1971 the laboratory space available to the Center will be approximately doubled with the completion of the second phase of interim research facilities. This space, with its specialized design will permit the implementation of new programs. Among the new programs to be implemented are those in: aerotoxicology; the development of special research animal species; investigation of comparative metabolic pathways in man and laboratory animals exposed to chemicals; the effect of exposure to environmental chemicals on early detectable changes in higher cognitive processes in laboratory animals; and the teratologic and genetic effects of exposures to environmental agents. A demography program will provide support and complement these studies through its epidemiology and biostatistics branches, the former facilitating the assessment of laboratory data as applicable to man and the latter providing guidance in experimental design as well as statistical evaluation of the significance of data.

The cell biology program will be expanded to include other toxicants of importance which are not being investigated. Studies on mutagenic effects will be emphasized. Attempts will be made to determine the reactivity of organic and organometallic compounds toward the nuclear genome of mammalian cells in tissue culture and toward isolated DNA from mammalian tissue. The agents selected will be among groups used as insecticides, herbicides, food additives, and various types of industrial chemicals.

As resources become available, additional programs related to subacute toxicology, biochemical pharmacology and physiological pharmacology will be initiated. Present studies on growth and development will be expanded to include studies of the potentially harmful effects of environmental chemicals on prenatal growth, the ability of such chemicals to enter the fetus through the placenta, and postnatal effects of prenatally-administered chemicals.

Chemistry, cell biology, pathology, and pharmacology scientists will collaborate on the development of a biological model system to relate the chemical structure of environmental agents to their ability to interact with various types of Deoxyribonucleic acid (DNA) and Ribonucleic acid (RNA) cells grown in tissue culture and those in the intact host.

The increase of $1,784,000 includes $1,400,000 and 28 positions for program increases, $93,000 for the annualization of the 1971 pay increase cost, $140,000 for the annualization of new positions received in 1971, $28,000 for cost of within-grade salary advances, $2,000 for FTS rate increase and $121,000 to National Institutes of Health Management Fund for centrally furnished services.

Collaborative Research and Development

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits............	---	---	---	---	---	---
Other expenses............	---	$984,000	---	$1,995,000	---	+$1,011,000
Total...............	---	984,000		1,995,000		+1,011,000

Introduction

This activity serves the important purpose of supplementing and complementing the Institute's intramural research program. Much of the research to be supported through this activity meets a high priority program need of the Institute but would not normally be proposed or initiated by the investigators. Research in this activity is supported through contracts and performed in collaboration with other Federal agencies, academic institutions and industrial research organizations. The research contract mechanism is employed in those instances where the scientific staff identifies program needs which cannot readily be met through the extramural or intramural programs.

Program Plans in 1971 and 1972

The contract-supported research program is now dealing with the toxicological effects of certain heavy metals, lead and cadmium in particular, with special emphasis on the brain, the liver, and the kidney; the interaction of pesticides and other organic chemicals with cell membranes; the production of mycotoxins by fungi that grow on tobacco; and the health hazards to which uranium miners are exposed. Contract support is also being provided for a study designed to evaluate the feasibility of defining and evaluating a specific biochemical marker which will facilitate automated screening of human population for mutagenic effects.

The increase of $1,011,000 will permit the expansion of on-going programs as well as initiation of new ones in the field of trace metal toxicology, screening of chemical mutagens in appropriate biological systems, evaluation of pesticides chosen to replace the residue forming pesticides and exploration of toxins in natural products. It will also allow the exploration of the hazards of inhalation of particulate matter as well as in the more restricted exposure originating from industrial processes which have been taken over by the hobbyist, the artist and the high school student turned craftsman.

Review and Approval of Grants

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.............	16	$266,000	16	$293,000	---	+$27,000
Other expenses.............	---	227,000	---	231,000	---	+4,000
Total................	16	493,000	16	524,000	---	+31,000

Introduction

This activity, under the Associate Director for Extramural Programs, supports the scientific, administrative, and clerical staffs responsible for the over-all coordination and administration of the Institute's grants and awards program.

Functions for which the staff are responsible include review and evaluation of fellowships, research and training grant applications for presentation to the Advisory Council; liaison with applicants, grantees, advisory bodies, other components of NIH and PHS, and other interested organizations; maintenance of a continuing review of ongoing Fellowships, research and training programs; and the compilation and reporting of scientific and fiscal information relevant to all transactions.

The increase of $31,000 will provide $25,000 for the annualization of the 1971 pay increase cost, $2,000 for mandatory within-grade pay increases and $4,000 to National Institutes of Health Management Fund for centrally furnished services.

Program Direction

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	22	$330,000	22	$344,000	---	+$14,000
Other expenses..........	---	66,000	---	69,000	---	+3,000
Total.............	22	396,000	22	413,000	---	+17,000

Introduction

This activity supports the Office of the Director, including the administrative, secretarial, and clerical staff required for the administration, technical direction and coordination of all Institute activities; the review of current and proposed programs; the introduction of new knowledge into currently operating programs; and the provision and supervision of centralized administrative services.

The increase of $17,000 includes $10,000 for the annualization of the 1971 pay increase cost, $4,000 for within-grade pay increases and $3,000 to the National Institutes of Health Management Fund for centrally furnished services.

Program Purpose and Accomplishments

Activity: Research grants (Public Health Service Act, Title III, Part A)

1971			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$9,480,000	Indefinite	---	$11,918,000

Purpose: Research grant funds support activities in the study of environmental health within universities, hospitals, laboratories, and other public or private nonprofit institutions. These grants stimulate new studies in fields where further exploration seems likely to be productive.

Explanation: Most of the projects supported by these funds represent a continuation of ongoing research concerned with the source, mode of entry, and biological effects of noxious agents in man's environment. The projects vary in scope from cellular and subcellular studies of the mechanisms of toxicity to field investigations to identify environmental agents acting as determinants of disease in man. They range in complexity from the small circumscribed activity of the individual researcher to broad-based programs that involve the integrated efforts of investigators from a variety of scientific disciplines. Knowledge derived from these projects will ultimately provide a basis for the setting of standards and the development of control activities.

Accomplishments in 1971: During this year, 26 new projects were initiated in areas of key concern, including pesticides, food toxicants, occupational hazards, heavy metals, physical hazards, chemical air pollutants and contaminants of water supplies. In addition, the Institute provided support for six university-based centers. These centers, each with its own area of special interest, pursue work in the areas of environmental toxicology, respiratory disease and aerosol physiology, pesticide biology and others.

Objectives for 1972: The budget request provides for an increase of approximately 25 research projects. These projects will be focused on those areas of particular concern to the Institute.

Activity: Fellowships (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$264,000	Indefinite	---	$264,000

Purpose: The fellowships program is a highly flexible means for supporting the research training of individuals at various stages of career development.

Explanation: These awards provide salary support over a five-to-eight year period for highly selected young scientists who have completed their basic research training and who have displayed outstanding aptitude for research.

Accomplishments in 1971: During 1971, the Institute supported 19 fellowships in the various categories with increased emphasis on the special and research career development awards categories.

Objectives for 1972: The funds requested will provide for 18 awards, one less than in 1971.

Activity: Training grants (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$2,843,000	Indefinite	---	$2,843,0000

Purpose: Graduate research training grants are made to educational institutions to improve and to enlarge the supply of qualified scientists who can engage in research on environmental health.

Explanation: The grants are awarded to institutions to strengthen the institutional support of training programs and to provide training opportunities for both part-time and full-time students at the pre- and post-doctoral levels in a wide range of disciplines central to the mission of the Institute.

Accomplishments in 1971: In 1971, there were 42 training programs supported by the Institute to provide training opportunities for 336 trainees.

Objectives for 1972: The estimate for 1972 provides for 34 training programs, eight less than in 1971. This reduction will be in the area of non-competing awards while competing awards will increase.

Activity: Laboratory and clinical research (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
197	$5,530,000	Indefinite	225	$7,314,000

Purpose: The intramural research program of the Institute was created for the purpose of investigating at the fundamental level the long-term subtle effects of environmental agents potentially hazardous to man.

Explanation: These studies are directed to the development of a scientific base for use in establishing standards and devising remedial measures. This information is a prerequisite to the establishment of generalizations and principles which can be applied in effort to assure protection of exposed populations.

Accomplishments in 1971: Late this year the Center's laboratory space will be approximately doubled with the completion of the long awaited critically needed second phase of interim research facilities. This space with its specialized design will permit the implementation of long delayed new programs in aerotoxicology, the development of special research animal species, investigation of comparative metabolic pathways in man and laboratory animals exposed to chemicals, and the teratologic and genetic effects of exposures to environmental agents.

Objectives for 1972: All new requested positions are required to activate this new highly sophisticated research space. These positions will enable the Institute to plan and carry out long deferred studies which will provide the scientific basis for the criteria which must be promulgated by the various environmental control agencies.

Activity: Collaborative research and development (Public Health Service Act, Title III, Part A)

1971			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$984,000	Indefinite	---	$1,995,000

Purpose: This activity serves the important purpose of supplementing and complementing the Institute's intramural research program. Much of the research to be supported through this activity meets a high priority program need of the Institute but would not normally be proposed or initiated by the investigators.

Explanation: Research in this activity is supported through contracts and performed in collaboration with other Federal agencies, university research centers, and industrial research organizations. The scientific staff identifies areas of concern where a research contract can more effectively provide the linkage or complementary effort needed but not readily available through the extramural or intramural research approach.

Accomplishments in 1971: During 1971 the Institute is continuing its support of contract research relating to a number of areas including the subcellular pathology of heavy metal intoxication; the detection of human somatic mutations, the study of the combined effects of smoking, inhalation uranium ore dust, radon daughters, and diesel oil fumes in hamsters and dogs; and the operation of the beryllium case registry. Additional studies being considered for support in 1971 include the toxicology of fungicides, the immunogenicity of inorganics, and the development of microwave radiation dosimetry techniques.

Objectives for 1972: The Institute will continue its contracts concerned with screening of chemical mutagens in appropriate biological systems, evaluation of pesticides chosen to replace the residue-forming pesticides, and exploration of toxins in natural products. In addition, projects will be supported to explore the hazards of inhalation of particulate matter originating from industrial processes, the equilibrium of trace metals and the toxic effect of air pollutants.

Activity: Review and approval of grants (Public Health Service Act, Title III, Part A)

		1972		
1971			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
16	$493,000	Indefinite	16	$524,000

Purpose: This activity supports the scientific, administrative, and clerical staffs responsible for the over-all coordination, and administration of the Institute's grants program.

Explanation: The extramural staff is responsible for review and evaluation of fellowships, research and training grant applications for presentation to the Advisory Council; liaison with applicants, grantees, advisory bodies, other components of NIH and PHS, and other interested organizations; maintenance of a continuing review of ongoing research and training programs; and the compilation and reporting of scientific and fiscal information relevant to all transactions.

Accomplishments in 1971: During the year, an estimated 190 grants were reviewed for scientific merit and program relevance, and surveillance was maintained over 164 grants. During 1970, the major portion of the grants program was relocated to the Institute headquarters in the Research Triangle Park, North Carolina. Completion of this move will be made during 1971.

Objectives for 1972: Staff activities will continue at the 1970 and 1971 level, with greater emphasis placed on the development of new programs in a wide variety of important areas.

Activity: Program direction (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
22	$396,000	Indefinite	22	$413,000

Purpose: This activity supports the Office of the Director of the Institute.

Explanation: The Office of the Director includes the immediate Office of the Director and includes the administrative, secretarial, and clerical staff required for the administration, technical direction, and coordination of all Institute activities; the review of current and proposed programs; the introduction of new knowledge into currently operating programs; and the provision and supervision of centralized administrative services.

Accomplishments in 1971: The Institute's contribution to the growing Federal responsibility for environmental quality is emphasized by the completion and publication in 1970 of the Report of the Task Force on Research Planning in Environmental Health Sciences. This report addresses itself to the broad array of environmental health problems and the potential means for their solution, with particular attention to those of greatest urgency. The report is important because it carries with each of the problems identified suggested means for their solution on the general, specific, short-range and long-range levels. During 1971, the Office of the Director will devote a significant portion of its resources to the establishment of effective and working relations with the newly created Environmental Protection Agency.

Objectives for 1972: The Office of the Director will continue to devote most of its resources to the selection of the research questions which most need investigation and to the planning and direction of the total programs of the Institute.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Laboratory and Clinical Research			
Scientist	GS-15	1	$24,251
Scientist	GS-14	1	20,815
Scientist	GS-13	2	35,522
Scientist	GS-12	6	90,240
Biological Laboratory Assistant	GS- 7	2	17,164
Biological Laboratory Assistant	GS- 5	3	20,814
Clerical Assistant	GS- 4	1	6,202
Laboratory Assistant	GS- 4	1	6,202
Laboratory Assistant	GS- 3	1	5,524
Biological Aid	GS- 2	10	48,970
Total		28	275,704

NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES

STATEMENT OF DR. DAVID RALL, DIRECTOR
ACCOMPANIED BY GEORGE KINGMAN, EXECUTIVE OFFICER

INTRODUCTION OF DIRECTOR RALL

Senator MAGNUSON. The next Institute is Environmental Health Sciences, Dr. Rall.

Dr. MARSTON. This is Dr. David Rall's first appearance before the committee. He is the new Director of the National Institute of Environmental Health Sciences. I am pleased to introduce him to you. He has been at the National Institutes previously, in the Cancer Institute. We had a nationwide search for a successor to Dr. Kotin. The committee that I appointed, after looking throughout the Nation, recommended Dr. Rall to me. I was delighted to be able to get him to leave the important programs he directed in NCI, and to bring his skills to the directorship of this important but still new Institute, and another important area, the environmental health sciences.

Senator MAGNUSON. We are glad to have him aboard.

Senator COTTON. Shall we give him the usual hazing?

Dr. MARSTON. I was hoping my comment would have the opposite effect.

Senator MAGNUSON. The first time they appear, they get cut.

INSTITUTE MISSION

Dr. RALL. A rather auspicious beginning. The mission of our Institute is to provide a scientific foundation to assist control agencies in their efforts to resolve environmental health problems. We seek to identify and understand better the chemical, physical, and biological factors in the environment, which are most likely to affect man's health.

For agencies like the newly created Environmental Protection Agency, this knowledge forms the basis for establishing effective control measures. During the few months I have been on this job, I have examined the Institute critically and in depth. I am pleased to report that the organization developed by my predecessor, Dr. Kotin, during the formative years of the National Institute of Environmental Health Sciences, provides a solid foundation for the continuation and expansion of significant and important research.

STUDIES OF METHYL MERCURY

Over the last year, we have carried out a number of studies which we feel are important. We have been particularly concerned in the last few years by reports of diseases resulting from the exposure to metallic mercury. Two features of these reports caused our alarm. First was the fact that the exposures were traced to metallic mercury which previously had been thought to be stable and inert and, therefore, not an environmental threat. This was explained by the reports that bacterial actions on the floors of the rivers, the bays, and the oceans converted metallic mercury to the toxic and dangerous methyl mercury. This points to the importance of basic research which includes the questioning of long-held assumptions.

The second feature was the realization that so little is known about the devastating central nervous system disorders which can result from metallic mercury poisoning. These can range from sensory disturbances, blindness, deafness, and brain damage.

At NIEHS, physicians and veterinarians are examining the pathologic changes which follow the ingestion of methyl mercury, in order to determine the fundamental mechanisms of action by which it does affect the brain, the kidneys, and the liver. Through these studies, they hope to relate blood and tissue concentrations of methyl mercury to the end-point toxicity.

Concurrently, biochemists are studying the effect of methyl mercury on cell components and enzyme systems. Pharmacologists are examining its effects on fetal development in animal models. It is our hope that this approach will lead to improved diagnostic techniques and methods for the reversal and repair of what today are irreversible effects of the ingestion of methyl mercury.

This morning, we discussed briefly marine pharmacology. The particular importance of the study of marine organisms, I think, can be illustrated by toxic environmental agents such as methyl mercury. The route of the toxic compound often is through a chain of marine organisms to final ingestion by man.

We are initiating studies on the way in which marine organisms concentrate and accumulate such toxic agents.

STUDIES OF NITRATES IN BABY FOOD

Let me briefly mention other important research programs. In consultation and collaboration with the university-based environmental health science centers, which we support, the Institute explored the extent of disease traceable to nitrate-nitrite exposure. The existence of nitrates in some well waters has led to poisoning in babies.

We were concerned because of reports that nitrates were present in high concentrations in baby foods, particularly those in Germany. We were able to demonstrate that nitrate levels in baby foods in the United States were well within safe levels, standing after opening and after partial cooking. Such studies do not make headlines, but we feel they are important. These efforts and others demonstrate the value of the Institute in its ability to contribute to the resolution of urgent national problems.

PROPOSED INCREASES

If I may, I would like to just take a few moments more to describe the ways we plan to use our request. Of the increase, $2½ million will be used to support research grants. We were able to fund less than 47 percent of approved grant applications last year. And of the increase, $1 million is allocated to research supported through contracts with universities and industrial centers which have resources which we cannot otherwise obtain.

Contracts will be used to accomplish research on metals like mercury, which might change their toxicity characteristics in association with organic matter.

On the health effects other than hearing and exposure to noise; on better methods for measuring exposure to microwaves; and similar other projects.

FACILITIES

This committee has demonstrated a continuing interest in the progress being made in the development of NIEHS facilities. Significant progress has been made during the year just ended, and I would like to report it to you.

PERMANENT QUARTERS AT RESEARCH TRIANGLE PARK, N.C.

Of great long-range importance is the completion in April 1971 of a land-utilization plan describing the best and most efficient use of the 509-acre site available for construction of our permanent quarters in the Research Triangle Park in North Carolina. Completion of this plan makes possible now our request for $2 million in planning funds, which is included in the "Building and facilities, NIH" appropriation.

This amount will permit the preparation of detailed and final architectural engineering drawings. Our hope is that we can ask for construction money and begin building during fiscal 1973.

INTERIM FACILITY ADDITION

The other important step relates to meeting our immediate needs. These have been met by the recent addition to our interim facility. This doubles our laboratory space and will permit expansion of important programs which until now have been space limited.

I am particularly pleased to note that this space was completed ahead of schedule. Planned completion was for July 1. We were actually able to move in, in the middle of May. All of the new personnel requested in the budget will be employed in these facilities.

Mr. Chairman, it is a pleasure to be able to report to you on the progress NIEHS has made and tell you of our plans for the coming year. I am confident that, with your continuing support, we will be able to develop further these programs which I believe are of such grave importance to this Nation's future.

I shall be delighted to answer any questions.

PERMANENT QUARTERS AT RESEARCH TRIANGLE PARK, N.C.

Senator MAGNUSON. Do you plan to have your whole operation other than grants in the North Carolina facility?

Dr. RALL. Yes, sir.

Senator MAGNUSON. Why did you select that particular 500 acres?

Dr. MARSTON. In a sense the Congress was instrumental in the selection.

Senator MAGNUSON. Congress?

Dr. MARSTON. Congress directed that this institute must be built outside of the Washington environs. There was a number of possible areas. The research triangle, this particular 500 acres, was finally selected both for this institute in association with the Environmental Protection Agencies laboratories. The result is that the Environmental activities not only within HEW but also in the new agency will be located at the Research Triangle Park in North Carolina.

Senator MAGNUSON. Congress said you should get out of Washington?

Dr. MARSTON. That is correct.

Senator MAGNUSON. But they did not tell you where to go? You made a study of this?

Dr. MARSTON. Yes, sir; a study was made.

Senator MAGNUSON. What was the reason? Did we own the land or was it cheaper, or what?

Dr. MARSTON. I think the main reasons were—and this was before my time at the NIH—that the research triangle had research activities there, that there were three universities in the general vicinity, and because it was a reasonable distance for commuting from the Washington area.

Mr. KINGMAN. There were a number of criteria which were used, Mr. Chairman, two of which were precisely what Dr. Marston said. A third criteria which was used by then Secretary Celebrezze, was the land be donated to the Government. It was and so we are in North Carolina.

Senator MAGNUSON. That would be one factor.

Off the record.

(Discussion off the record.)

Senator MAGNUSON. At least you are out of Washington.

Dr. RALL. That is right.

FUNDING ADEQUACY

Senator MAGNUSON. You had $20 million, approximately, last year. You got $5 million more this year. If you are going into the environmental problems, of course, that is not a very big figure to do everything that should be done any more than the money we appropriated under the Clean Air Act and the Clean Water Act. But you are doing research.

METHYL MERCURY RESEARCH

What do you do on the water situation?

Dr. RALL. Specifically in water, we would be interested, since the example I used, methyl mercury, is really a contaminant in water, our program would be first to find out how the methyl mercury gets into man, how does it travel from the water through the food chain into man.

ADVISORY ROLE TO CONTROL AGENCIES

Senator MAGNUSON. That brings me to the question, do you then furnish guidelines for Food and Drug as to the level of mercury now in canned fish? Do you suggest guidelines or do you give them advice as to what level is safe and what level is unsafe?

Dr. RALL. We give them the basic information. It lets' them establish the guidelines.

Senator MAGNUSON. Then they make the decision on the guidelines, particularly on canned seafoods?

Dr. RALL. That is right, generally in consultation with us.

Senator MAGNUSON. Because they have a laboratory to analyze and make a quality analysis of what they find in the can, but they don't have research to find out how mercury, for instance, got into the tuna.

Dr. RALL. That is right.

Senator MAGNUSON. This is what you are trying to find out.

Dr. Rall. That is right.

Senator Magnuson. Or the swordfish or whatever it may be.

Dr. Rall. That is right.

RESEARCH RELATED TO AIR POLLUTION

Senator Magnuson. What do you do in the air field?

Dr. Rall. Very much the same sort of thing. We are interested particularly in the interactions of the various air pollutants, how they affect the lung and the whole body. In our new facilities there are special chambers where we can expose animals to any sort of atmosphere that we can create. One of the major pollutants in air is in fact lead. About half of the body burden of lead comes by inhalation. This has led to serious problems of lead toxicity, not particularly the children who eat lead but the long-term low-level effect of lead.

Senator Magnuson. Then, say a State wanted to have a pollution commission on air and water. They would then set levels or that would aid them in enforcement of their regulations. But you have nothing to do with the enforcement of regulations?

Dr. Rall. You are absolutely right.

Senator Magnuson. But they have to have this information.

Dr. Rall. Yes. I think we can do a little more than that, too. I think one of our major efforts is going to have to be to find antidotes, how can you counteract effects. I am sure there will be pollutants that we simply cannot get rid of. How can we learn to live with them? Are there other ways of letting the body tolerate this?

Senator Magnuson. Of course the major villain of air pollution is the automobile. Up in the Commerce Committee we have been passing laws, or trying to, to get what you call lead-free gasoline or different types of motors to take care of that. That is, as I understand it, about 65 percent of the pollutants, particularly in metropolitan areas, is automobiles. Do you do research on that, on the automotive aspect?

Dr. Rall. Not directly. We do research on the effect of some of the contaminants that come from automobiles.

Senator Magnuson. Certain types of gasolines?

Dr. Rall. Or the end products of gasoline combustion.

Senator Magnuson. Although the Senate committee said yesterday all gasoline is the same.

Dr. Rall. That is not what I hear on television.

Senator Magnuson. It is not what I hear, either. They interchange the sale of it. But it is still the gasoline that causes the pollutant.

Dr. Rall. Well, the additives to the gasoline may be what is serious. For instance, lead is just an additive. Lead is one of the major pollutants.

RESEARCH AND TRAINING GRANTS PROGRAM

Senator Magnuson. Now, in your grant program, how much of this $25 million is for grants?

Dr. Rall. Of the $25 million, there is a total of about $12 million for research grants and about $3 million for fellowships and training.

Senator Magnuson. Fellowships and training?

Dr. Rall. Yes, sir.

COOPERATION WITH ENVIRONMENTAL PROTECTION AGENCY

Senator MAGNUSON. Now, how do you get away from duplication with the Environmental Protection Agency or how do they get away from duplicating you? Take it either way.

Dr. RALL. This is a potential problem of which we are all aware. A fair amount of my time has been spent getting to know the people in the Environmental Protection Agency who will interact with us, who need the information that we can provide. We have a small group of people who actually are responsible for all liaison activities. They visit on a frequent basis with scientists and administrators in FDA so that FDA knows what we are doing, we know what FDA is doing, and we try to work together as closely as possible.

Dr. MARSTON. The main dividing line, of course, is the fact that Dr. Rall's institute is concerned with health and with the relationship of research in other areas of biomedicine. It is a clear-cut separation. We have the competence in this Institute in the health area and in the cross-relationship with other areas of biomedicine.

LIAISON WITH THE DEPARTMENT OF TRANSPORTATION

Senator MAGNUSON. Do you have any liaison with the Department of Transportation?

Dr. RALL. Not at the moment.

Senator MAGNUSON. They are setting regulations. Every week there is some kind of new regulation in the field of transportation. A lot of it is related not only to safety but environment.

Mr. KINGMAN. Mr. Chairman, I am aware of something which occurred prior to the time Dr. Rall came.

We were asked by the Coast Guard to consult with them on some of their responsibilities with regard to water pollution. Thus, while we have not had significant liaison activities with DOT we have had a consultative relationship with one of its constituent agencies.

RESEARCH ON NOISE

Senator MAGNUSON. They are involved in the noise field. I don't know how you can do much research on noise. It is there or it isn't there. Everybody knows it has an effect, a lot of effects, on people.

Dr. RALL. What we are interested in and concerned about is whether there are effects on the major bodily functions, not just on hearing. I think that is well documented. There are diurnal rhythms within everybody, patterns by which you wake and sleep. There is some very slight evidence that noise may alter these.

We think it would be very important to see if this is true and what the mechanism of this might be.

Senator MAGNUSON. I suppose you could make a quick study of whether a fellow working in a boiler factory lives longer than a fellow who lives up in the woods, could you not?

Dr. RALL. That would be one way to do it.

Senator MAGNUSON. Or the jackhammer operator. Haul in some of these fellows on motorcycles, take care of them. That is a big field.

We went through all this testimony, Senator Cotton and I, in relation to airplanes. I think the statement was made that they didn't think there were 10 really good noise experts in the United States. They just aren't around. When they set the decibel levels, nobody knows whether that is the right level, the wrong level, or how it affects anyone.

Dr. Rall. We like to think we have one of them.

Senator Magnuson. You are pretty good if you have one of the 10. But this was the testimony. They just weren't around.

I have no further questions.

You have a great big job with not very much wherewithal. I think there has to be a whole shakedown in all Government departments on this whole environmental thing. Some of the duplications that are bound to occur sooner or later, should be avoided. We need to put it all together.

Senator Cotton. I have one question.

RESEARCH RELATED TO FDA

I think you made it fairly clear where you leave off and the Food and Drug Administration starts.

I was interested in your illustration on baby foods. Now, it is the duty of the Food and Drug Administration to see that unsafe substances of that kind that are not permitted to be marketed. Where do they get their research to find out about these things? Do they depend on you or do they depend on different sources?

Dr. Rall. They have some research efforts of their own which provides some of this information.

Senator Cotton. That baby food illustration, it would seem to me—I am not criticizing; it is good work, and that is fine—but it would seem to me the type of thing that the Food and Drug Administration would be responsible for——

Dr. Rall. Let me go into that a little bit more.

The critical issue was not so much the concentration of nitrates and nitrites in the unopened baby food as it was sold, as it was on the patterns of the mothers. They would open it, let it stand out for a few hours before they used it, perhaps heat it.

Under these conditions, there was a possibility that much more nitrite could have been formed. This was probably beyond the purview of the Food and Drug Administration. We were asked by the National Canners Association for our views on this matter.

We felt it was an important problem and we tackled it and we found out this does not happen in the United States; therefore, they are safe. Earlier I mentioned the problem of nitrates in well water as well as in baby food. With the greatly expanding use of nitrogen fertilizers the question has been asked if we are in danger of raising the nitrate content of our water supplies to toxic levels. Current findings are that, with perhaps a few isolated exceptions, the nitrogen we are putting into the earth is still less than that which we are removing: thus no realistic hazard exists yet.

These findings point out the nature of the environmental problems we are dealing with. They are not limited to a single medium, like air or water or a class of products; rather they are broadly present in the environment and have the potential for adversely affecting man's weather almost without regard for how they are introduced into his body.

Senator MAGNUSON. There is a lot of thinking around Government and in Congress right now and I guess you people have heard about it but the Food and Drug Administration should be folded into perhaps the Agriculture Department.

What do you do about pesticides on that?

RESEARCH ON PESTICIDES

Dr. RALL. We do a great deal of research on the effect of pesticides.

Senator MAGNUSON. They have their own research, don't they?

Dr. RALL. Now it is the Environmental Protection Agency that has the responsibility.

Senator MAGNUSON. Of course, the Food and Drug Administration is set up to be a separate unit basically so that they would be independent in the enforcement of things after they had set the standards and not be subject to any administration pressure or congressional pressure or anything else.

Now it is getting so bad that where you become a part of it they just can't handle that end of it any more. As a result, they have to skimp on their enforcement personnel and all these other things.

You can read the criticism, unfounded in some cases, but there is plenty of it about them.

Do you have any liaison with NOAA?

Dr. RALL. Not formally, but we are interested.

Senator MAGNUSON. You should be. Of course, that is a new agency just starting out. Dr. White is an excellent man. They don't have the research. They would have to rely on you.

We have a new law, a boat law, not only safety but pollution. One of those outdoor motors pollutes the air more than three cars. Does it go in the water or not? We don't know, do we? We don't know what it does to the lake, for instance.

You have a big job. I would think you would have the toughest time in the world on priorities, what next to tackle.

Dr. RALL. This is something we are concerned about.

We are trying to develop a group who will look at technological forecasting, what are going to be the next toxic compounds.

Senator MAGNUSON. All right.

We thank you very much.

Come up and visit us again from North Carolina.

Dr. RALL. We will be delighted to.

NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH RESOURCES

Justifications

Appropriation Estimate

RESEARCH RESOURCES

To carry out, except as otherwise provided, section 301 of the Public Health Service Act with respect to the support of clinical research centers, laboratory animal facilities and other research resources, [$66,201,000] *$68,069,000.*

Amounts Available for Obligation

	1971	1972
Appropriation	$66,201,000	$68,069,000
Real transfers from:		
"National Institute of Arthritis and Metabolic Diseases" (Proposed transfer for increased pay costs)	75,000	---
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs)	44,000	---
Comparative transfer to:		
"Office of the Director"	-10,000	---
Comparative transfers from:		
"Biologics Standards"	94,000	---
"National Cancer Institute"	27,000	---
Total obligations	66,431,000	68,069,000

Obligations by Activity

Page		1971 Estimate		1972 Estimate		Increase or Decrease	
Ref.		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Grants:						
202	Research............		$62,810,000		$64,310,000		+$1,500,000
	General clinical research centers...		(38,004,000)		(39,004,000)		(+1,000,000)
	Scientific evaluation.........		(215,000)		(215,000)		---
	Biotechnology resources..........		(9,617,000)		(10,117,000)		(+500,000)
	Animal resources....		(14,974,000)		(14,974,000)		---
212	Fellowships..........		126,000		126,000		---
213	Training............		352,000		352,000		---
	Direct operations:						
214	Collaborative research and development.........	2	1,386,000	2	1,391,000	--	+5,000
214	Review and approval..	52	1,055,000	52	1,153,000	--	+98,000
215	Program direction....	30	702,000	30	737,000	--	+35,000
	Total obligations...	84	66,431,000	84	68,069,000	--	+1,638,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions........	84	84	---
Full-time equivalent of all other positions	3	4	+1
Average number of all employees...........	82	83	+1
Personnel compensation:			
Permanent positions.....................	$1,085,000	$1,165,000	+$80,000
Positions other than permanent..........	11,000	64,000	+53,000
Other personnel compensation............	28,000	36,000	+8,000
Subtotal, personnel compensation.......	1,124,000	1,265,000	+141,000
Personnel benefits........................	120,000	128,000	+8,000
Travel and transportation of personnel.....	102,000	102,000	---
Transportation of things..................	8,000	8,000	---
Rent, communications, and utilities........	42,000	42,000	---
Printing and reproduction.................	44,000	18,000	-26,000
Other services:			
Project contracts.......................	1,205,000	1,255,000	+50,000
Payment to NIH Management Fund..........	221,000	239,000	+18,000
Other.................................	255,000	202,000	-53,000
Supplies and materials....................	17,000	17,000	---
Equipment................................	5,000	5,000	---
Grants, subsidies, and contributions.......	63,288,000	64,788,000	+1,500,000
Total obligations by object...........	66,431,000	68,069,000	+1,638,000

Summary of Changes

1971 estimated obligations	$66,431,000
1972 estimated obligations	68,069,000
Net change	+1,638,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases				
A. Built-in				
1. Annualization of 1971 pay increase costs	---	---	---	+$98,000
2. Within-grade pay increase	---	---	---	+11,000
3. FTS rate increase	---	---	---	+6,000
4. One extra day of pay	---	---	---	+5,000
Total built-in increases	---	---	---	+120,000
B. Program				
1. Research grants				
a. General clinical research centers	---	$38,004,000	---	+1,000,000
b. Biotechnology resources	---	9,617,000	---	+500,000
Total program increases	---	---	---	+1,500,000
C. Payment to "NIH management fund" for centrally furnished services	---	221,000	---	+18,000
Total increases	---	---	---	+1,638,000

Explanation of Changes

Built-in--The built-in increases will provide $98,000 for annualization of 1971 pay increase costs, $11,000 for within-grade pay pay increase in 1972, $6,000 for increased cost in 1972 of using the Federal Telecommunications System and $5,000 for one extra day of pay in 1972.

Research grants--The program increase of $1,000,000 for General Clinical Research Centers will provide for continuing operations of existing centers. The increase will be utilized to offset the annual rising hospitalization and personnel costs currently estimated at a minimum of six percent.

The increase of $500,000 for Biotechnology Resources will help offset the increased cost of these resources and allow for a limited increase in the scope of projects supported in selected areas such as electron microscopy.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action taken or to be taken
1971 House Report	
1. The creation of a separate division to administer these research resource and general research support programs has considerable merit. However, the committee sees no logical reason for placing this new division in the Bureau of Health Professions, Education, and Manpower Training. Moreover, this organizational misalinement distorts NIH budget presentations which in other respects, draw a rather clear distinction between its research and its health manpower programs. The committee endorses the proposal, now being considered, to include the Division of Research Resources among the research components of NIH. (page 31 of House Report)	1. On September 18, 1970, the Division of Research Resources was reorganized out of the Bureau of Health Professions Education and Manpower Training and was established as a free standing research Division of the NIH. Its budget tables and justification will therefore be included with the other research components of the NIH and afford the committee a clearer presentation of these research activities.
1971 Senate Report	
1. The Division, though solely concerned with the support of research resources, is at present organizationally part of the Bureau of Health Professions Education and Manpower Training. The Committee believes that the interests of all concerned would best be served by realigning the Division of Research Resources with the other research components of NIH. (page 53 of Senate Report)	1. The action taken is the same as the action taken for the House Report.

Authorizing Legislation

Legislation	1972	
	Authorization	Appropriation requested
Public Health Service Act Section 301--Research and Investigation, in general........................	Indefinite	$68,069,000

PUBLIC HEALTH SERVICE ACT

Title III -- General Powers and Duties of Public Health Service

PART A -- RESEARCH AND INVESTIGATION

In General

"Sec. 301. The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification, sewage treatment, and pollution of lakes and streams. In carrying out the foregoing the Surgeon General is authorized to--.....

(c) Establish and maintain research fellowships in the Service with such stipends and allowances, including traveling and subsistence expenses, as he may deem necessary to procure the assistance of the most brilliant and promising research fellows from the United States and abroad;

(d) Make grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals for such research or research training projects as are recommended by the National Advisory Health Council....."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer from:		
National Institute of Arthritis and Metabolic Diseases	$75,000	Proposed transfer for increased pay costs.
National Institute of General Medical Sciences	44,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
Office of the Director	-10,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
Comparative transfer from:		
National Cancer Institute	27,000	To provide an equitable distribution of the Management Fund in 1972.
Biologics Standards	94,000	To provide an equitable distribution of the Management Fund in 1972.

Research Resources

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$95,341,000	$119,275,000	$140,000,000	$127,637,000
1963	147,826,000	155,826,000	161,826,000	159,826,000
1964	164,674,000	163,869,000	164,674,000	163,869,000
1965	163,715,000	162,959,000	164,759,000	164,759,000
1966 1/	58,719,000	59,969,000	60,469,000	60,469,000
1967	67,821,000	68,534,000	68,534,000	68,534,000
1968	81,141,000	81,141,000	81,141,000	81,141,000
1969	87,500,000	82,719,000	94,823,000	84,809,000
1970	69,698,000	73,658,000	79,658,000	76,658,000
1971 2/	63,701,000	66,201,000	66,801,000	66,201,000
1972	68,069,000			

1/ Excludes the "National Institutes of General Medical Sciences" established as a separate appropriation in 1966.

2/ Excludes the Division of Computer Research and Technology incorporated into the "National Institutes of Health Management Fund" in 1971.

Justification

Research Resources

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..................	84	$1,244,000	84	$1,393,000	--	+$149,000
Other expenses..............	--	65,187,000	--	66,676,000	--	+1,489,000
Total..................	84	66,431,000	--	68,069,000	--	+1,638,000

Background:

Both the Senate and House Committees on Appropriations endorsed the proposal to include the Division of Research Resources among the research components of the National Institutes of Health. A reorganization to effect just this action was carried out on September 18, 1970. Under this realignment the Division of Research Resources was established as a free-standing research Division of the National Institutes of Health. The Division's budget will now be included in the research portion of the overall NIH budget presentation. Organizationally DRR's status as a research Division of the NIH should enable it to better fulfill its broad based mission of supporting the core resources of institutions involved in biomedical research.

General Statement

The National Institutes of Health in support of the national goal of improving and sustaining the health and well-being of the American people, has as an objective the advancement of the Nation's capability for the maintenance of health and for the diagnosis, treatment and the prevention of diseases through the production of new knowledge and professional manpower. It has pursued this, in the main, through the development and maintenance of a strong academic base for the health sciences to provide a broad institutional framework for health research, education and service.

The objectives of the Division of Research Resources in support of this broad NIH mission are (1) to establish and sustain, primarily in academic institutions but also in certain nonacademic research organizations, those resources essential to the advancement of biomedical research and research training leading to the improvement of the health of the Nation; and (2) to assist in the maintenance of the autonomy and individuality of academic institutions in the face of categorical organization of Federal health agencies through flexible general research support funds. This latter program is discussed in General Research Support Grants.

Research Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
General clinical research centers..................	$38,004,000	$39,004,000	+$1,000,000
Scientific evaluation.......	215,000	215,000	---
Biotechnology resources.....	9,617,000	10,117,000	+500,000
Animal resources...........	14,974,000	14,974,000	---
Total research grants.....	62,810,000	64,310,000	+1,500,000

General Clinical Research Centers

General Clinical Research Centers are physically discrete research hospital units located in university-affiliated hospitals. The units provide essential bed space, necessary equipment, controlled conditions, and trained personnel for clinical research in every area of medical science. Thus, the General Clinical Research Centers program makes available, in effective form and adequate number, those facilities and resources required by the Nation's scientists to conduct accurate and detailed clinical investigation. Each Center serves as a focal resource for inquiry, examination, and education in an effort to improve the quality of medical care and to enable collaborating groups of investigators from all medical disciplines to study abnormal physiology in virtually all categories of human disease.

The application of fundamental biological knowledge to the care of the clinically ill patient is essential in the fight against human disease. The Clinical Research Centers function as a critical interface at which laboratory discoveries can be translated expeditiously and efficiently into improved mechanisms of patient care. Through a communication network which includes university hospital physicians, physicians primarily with direct patient care, and medical journals, the medical advances emanating from these Centers are brought to bear on the practice of medicine in the 580,000 beds in the 3,700 hospitals across the country that provide most of the inpatient care for acute illness in the United States.

In fiscal year 1970, the Program supported 904 research beds which were distributed through university hospitals containing more than 53,700 beds. More than 2,600 investigators utilized these Centers in the conduct of 3,800 research projects covering virtually all aspects of human disease. Training in clinical medicine was provided to 7,400 individuals. Studies conducted at the Centers included research in cancer therapy, transplantation, population control, growth and development, mental retardation, heart disease, and high blood pressure. The range of clinical research activity is further demonstrated in the following compilation of a few of the many research accomplishments of General Clinical Research Centers during the past year.

High blood pressure: The Clinical Research Center at the University of Colorado is conducting clinical studies on a new drug to combat high blood pressure, minoxydyle. Almost 50 percent of all deaths in the United States are the result of diseases of the blood vessels. Of these, a significant number are due to high blood pressure (hypertension) which, if untreated or poorly controlled, will lead to progressive blood vessel damage and may result in time in cerebral stroke or coronary occlusion (heart attack). Although drugs for the treatment of high blood pressure have been available to medical practitioners for over a decade, none of these have been entirely satisfactory, in part because of the severe side effects they can produce. Unlike other antihypertensive agents, minoxydyle functions by producing directly a relaxation of the constricted blood vessels responsible for increased blood pressure. To date, it seems to be without many of the side effects which complicate the use of other drugs. When carried to completion, these studies will define the therapeutic potential of this powerful new antihypertensive agent and from them may develop new and hitherto impossible approaches to therapy.

At the Clinical Research Center at the University of Southern California, a new x-ray technique has been developed which may lead to early diagnosis and treatment of one of the treatable forms of high blood pressure. It has been estimated that among adult Caucasians with high blood pressure, ten percent suffer from a form due to excessive secretion by the adrenal glands of the hormone aldosterone. This hormone is normally present in the human body and is essential in the maintenance of normal blood pressure. In the patient with aldosterone-related high blood pressure, excessive aldosterone secretion most commonly originates from nonmalignant tumors in one of the adrenal glands. Surgical removal of such tumors results in a complete cure. Until now, it has been essential to subject the patient to extensive surgery in order that direct visual exploration of the abdominal cavity might be conducted to discover all such aldosterone-producing tumors. The new x-ray technique, by allowing the tumors to be located directly prior to surgery, will allow a much more simple operation to be performed. The surgeon may go directly and quickly to the site of the tumor and remove it, thereby greatly reducing the morbidity and mortality which has in the past been associated with this operation.

Emotional deprivation and disease: Children who are not given sufficient love and emotional satisfaction frequently develop disabling clinical problems. Scientists at the Children's Hospital, Pittsburgh, Clinical Research Center have recently studied several of these neglected children who have developed symtomatic hypoglycemia (a pathologically low, often life-threatening level of blood sugar). Investigation of these children led to the documentation of deficient function of the adrenal cortex, the gland responsible for the production of cortisone, a steriod hormone very important in the maintenance of normal blood sugar. The low blood sugar symptoms disappeared rapidly following improvement in the home environment of these children.

One of the most important and exciting observations in the field of pediatrics in the last ten years has been the documentation of the harmful effect of emotional deprivation on both physical and psychological growth of the child. The syndrome of maternal deprivation dwarfism is well documented. The probable mechanism of this condition is emotional neglect or adverse emotional environment, producing psychological stress which in turn leads to inhibition of release of hormones essential in the normal growth of humans. Upon removing such children from the adverse environment, rapid physical growth occurs and improvement in intellectual functioning follows.

As "Idiopathic hypoglycemia" (low blood sugar of unknown origin) is a significant problem within the pediatric age group, this documentation of the relationship between emotional deprivation and hypoglycemia mediated by adrenal cortical insufficiency is of great significance in the diagnosis and treatment of a large number of children, the cause of whose disorder heretofore has probably been undetected.

Pulmonary Emboli: The General Clinical Research Center at Temple University Hospital, Philadelphia, is currently involved in a new therapy for pulmonary emboli. Blood clots which form in veins in the legs and which break away to pass in the blood streams and lodge in the lungs (pulmonary emboli) account for profound illness and even death in many Americans each year. For a number of years, scientists have searched for a chemical agent with the capacity to dissolve the clots after they have lodged in the lungs in order that the circulation might be restored. This Center is currently involved in a study on the action of the chemical enzyme, streptokinase, produced in the laboratory by bacteria, which has recently become available in sufficiently pure form to be used on patients. This study is not yet complete, but preliminary data indicate that this agent will be significantly more useful in preventing the death of patients from pulmonary emboli than is any treatment currently available.

Obesity: In the Clinical Research Center at Rockefeller University, studies of fat cells and their metabolism have been conducted in children with marked obesity.

One current theory of obesity holds that the number of fat cells developed in the body earlier in life remains constant throughout adult life and that the greater the number of fat cells a person contains the greater is his liklihood ob becoming and remaining obese in adulthood. In significant numbers of the obese children studied in the Center, although total body fat decreased on a controlled weight reduction program, significant decreases in the numbers of fat cells were not found. As a result of these studies, patients less than six years of age are being preferentially admitted for weight reduction, as they are the only grossly obese patients in whom adult patterns and numbers of fat cells have not yet developed and in whom weight loss may be more permanent. Such studies are of significance in that if it can be documented that the development of fat cells in childhood is a response to the typesand volume of food eaten by the child at an early age, preventive nutritional measures may be developed by which such cellular patterns, and thereby the difficulties of obesity which are currently present in the adult population in most affluent nations, may be prevented.

Organ transplantation: The field of organ transplantation has been greatly advanced by the research done in this field in Clinical Research Centers. The majority of the transplantation studies performed in Clinical Research Centers have involved kidney transplantation. Recently, the Clinical Research Centers have undertaken exciting studies on the transplantation of other organs.

At the University of Arkansas, scientists have developed a technique of transplanting very small pieces of skin (micrographs). Using this technique, they have evaluated the rejection of these skin grafts and how this rejection may be altered by chemical treatment of the graft prior to its implantation. The ultimate goal of such a study is to develop the potential for permanent skin transplantation in patients suffering from extensive burns. By treating the grafts, the survival time of the graft has been greatly lengthened. This method is far superior to treating the recipient with systemic drugs which lower his body's resistance to infection.

Scientists at the Clinical Research Center at Roswell Park have been transplanting human fetal thymus glands into patients with Hodgkin's disease, a progressive malignant disease of the lymph nodes, spleen, liver and other organs. It is known that patients with Hodgkin's disease have a defect in the immunologic--or defense--system of the body. By transplanting fetal thymic tissue, which is known to be the origin of the body's immunologic system, scientists hope to control this deadly disease.

Many cases of blindness are due to disease or of injury to the cornea--the transparent membrane covering the eye. At the University of Florida Clinical Research Center scientists have restored sight to these people by corneal transplantation. A technique has been developed in which corneas removed after death may be preserved indefinitely for future transplantation. The development of this storage technique has been of extreme importance in supplying a constant source of tissue for transplantation.

Program Plans in 1971 and 1972:

The $39,004,000 requested for fiscal year 1972, an increase of $1,000,000 over the fiscal year 1971 budget level, will allow the Program to conduct its activities at close to present operating levels. New Program guidelines will allow investigators more flexibility in the ability to diversify their activities to include research on ambulatory patients. The increased funds will be utilized to offset the annual rising hospitalization and personnel costs currently estimated to a minimum of six percent.

Scientific Evaluation

This activity provides support for the study sections and preliminary review committees used by the Division to provide scientific merit review of grant applications. These study sections and committees, composed of outstanding authorities in the various field of medical research, are responsible for the scientific peer evaluation of all research grant applications. Their findings and recommendations with the grant applications are forwarded to the National Advisory Research Resources Council.

Biotechnology Resources

In November 1970 the Special Research Resources Program was renamed the Biotechnology Resources Program in order to more specifically convey the true character of its activities.

The goals of the Biotechnology Resources Program are to improve the Nation's health and health research by (1) making available to the biomedical community highly sophisticated instruments and methodologies and their associated expertise for use in modern health research, education, and patient care and (2) sponsoring centers of scientific and technological excellence which can take the lead in the discovery and development of the new health research and patient care methodologies originating in the physical sciences. While the support of life science computer resources was the main thrust of the program when it was established in 1962, the Program has diversified since then to include many of the new advanced technologies such as high resolution mass spectrometry, nuclear magnetic resonance spectrometry, and high voltage electron microscopy that are pertinent to the biomedical area.

In F.Y. 1971 the program anticipates funding 35 Biomedical Computer Resources, eight Biochemical Instrumentation Resources, three Biological Materials Preparation Resources, and one High Voltage Electron Microscopy Resource. Typically these resources: (a) provide service to biomedical scientists who need access to the instrumentation and the technical expertise of the resource for the conduct of their research projects--these specific projects are funded primarily by the categorical institutes of NIH, (b) conduct research and development within the resource directed toward the improvement and extension of resource capabilities as they relate to human health, and (c) train biomedical scientists in the capabilities of the resource, especially as applied to biomedical research and patient care. This mode of operation allows the most efficient and effective utilization of the resource. In particular, it allows the scientific community access to these complicated and costly research tools and associated skills that could not be justified or fully utilized on an individual basis.

In fiscal year 1970, more than 1,867 health scientists utilized the computer resources. Investigations in these resources spanned a range of activities from the storage and retrieval of clinical information and statistical data reduction to the automatic diagnosis of heart disease and the on-line monitoring of the critically ill. In an analogous fashion, 273 investigators used the Biochemical Instrumentation Resources to elucidate the molecular structure of chemical substances that comprise or interact with living organisms. These investigations aid in the study and diagnosis of various human disorders that are known to have a molecular origin. In addition approximately 19,000 biological preparations normally unavailable from commercial sources were provided by the Biological Materials Preparation Resources for use in biomedical research.

Computer Resources

Computer resources serve a wider range of programs of the NIH categorical institutes than do any of the other resource types. There remains today almost no biomedical area which has not had some productive encounter with computer technology, and the Biotechnology Resources Program has been primarily responsible for this. Moreover, as the complexity of health care and health research rises, the frequency and scope with which computer technology is applied to the health sciences will certainly increase. Examples of the activities that have found the computer to be an invaluable and indispensable tool include the following.

Drug information program: The hospital patient today receives on the average eight potent drugs during his stay. The possibility that the combination of two or more of these drugs is incompatible and toxic to the patient is high, particularly when it is realized that physicians have some 4,000 different drugs from which to choose when prescribing medicine for their patients.

This potential hazard is being systematically eliminated in the Stanford Medical School Hospital Center. Here a computer system is being developed to monitor all drugs prescribed for individual patients and detect all drug combinationa that might result in adverse interactions. If such a combination is identified, the nursing staff and physician are notified before the drugs are administered to the patient. The physician, aware of the potential hazard, may choose to administer the drug combination and watch the patient carefully or with the aid of the computer select a combination of drugs more compatible and nontoxic to the patient.

The Stanford Medical Center believes this program will not only eliminate many undesirable drug reactions occurring in patients subjected to multiple drug therapy but also help in the promotion of a rational and rigorous approach to drug therapy and lead to the development of a common data base which will be useful in both clinical research and patient care.

Cardiovascular diseases: The Mayo Foundation Computer Facility has added another dimension to the study of cardiovascular disease in intact animal and man. With the combination of roentgen videometry (an extension of x-ray methods) and computer techniques, the Center has developed a system which generates dynamic three-dimensional television images of the ventricular cavities of the heart during individual cardiac cycles. Changes of shape and volume of the cavity can be followed and related to simultaneous changes in blood pressure and blood flow. Stop action, slow motion, and real-time replay of the images are possible. The roentgen videometry computer assembly provides a degree of power for studying cardiovascular dynamics in heart disease which has been unattainable heretofore and does it without subjecting the animal or human subject to serious discomfort or risk.

Blood disorders: A research advance in the study of blood disorders and other related diseases has been made by the UCLA Computer Center. This resource has developed a mathematical model which enables researchers studying the hematopoietic (blood-cell producing) system to design and analyze their experiments quantitatively with the aid of the computer. Using simulation techniques, various versions of the model can be constructed and the resulting behavior determined by monitoring the course of the computation with the aid of the on-line TV-like display. Various feedback mechanisms, the oxygen carrying capacity of the red blood cells, and the response of the hematopoietic system when challenges are placed upon it are some of the characteristics that are being examined using this technique. Studies such as these will play an important part in the identification of the causes of and treatment for many types of anemia and other blood diseases.

Cancer research: The design of drugs selectively toxic to cancer tumor cells (e.g., human leukemias) is highly dependent on the knowledge of the growth behavior of these cells and upon the differences that exist in the cell division cycle of normal and tumor cells. Investigations currently under way using the computer resource at the University of Pennsylvania are aimed at understanding these differences and obtaining detailed information on cell growth cycles. By studying the incorporation of radio-labelled compounds into various types of tissues over time as cells proliferate, information on cell growth is assembled by the investigators into a series of complex oscillating curves. Then, with the help of the computer, they calculate from these curves the relative distribution of the cells in the population among the various stages of growth and division as well as other parameters that describe the cell cycle. These derived results have important implications not only in analyzing tumor cell growth and in understanding the underlying bases for abnormal growth of cancer cells, but also in determining how and when to administer selected drugs such that they kill the maximum number of tumor cells without severely imparing an unacceptably large number of normal ones.

Biochemical Instrumentation Resources

As more and more human diseases are shown to have a molecular basis, and as diagnosis and treatment of disease become increasingly dependent upon the identification of certain chemical substances in the body fluids, the needs for highly sophisticated techniques to study biological molecules continue to grow. In response to these needs, the Biotechnology Resources Program sponsors Biochemical Instrumentation Resources, involving especially high resolution mass spectrometry and high resolution nuclear magnetic resonance spectroscopy, two of the most powerful techniques known for elucidating the molecular structure of chemical substances that comprise or interact with living organisms. Examples of these studies done in these resources are given in the following.

Population Research: The role prostoglandins play in the control of human reproduction is under investigation at the University of Pittsburgh Mass Spectrometry Facility. These hormones are believed to play a role in the induction of normal labor and preliminary studies indicate they may be used to successfully evacuate the uterus and therefore are believed to play a role in labor and the process of giving birth. Using a gas chromatograph-mass spectrometer system, this Facility developed a method to identify nanogram (one billionth of a gram) quantities of prostoglandin in human tissue. With this method it will be possible to monitor physiological levels of these hormones in human blood and other tissues rapidly and quantitatively, a feat not heretofore possible. Such measurements may be useful in the management of spontaneous abortions and in an understanding of the role of these ubiquitous agents in male infertility.

Drug abuse: Physicians today are being faced with an increasing number of patients suffering from an overdose of drugs. The escalating number of drugs in use makes the task of diagnosing these patients even more complicated. Patients in coma present a critical problem to the physician because early treatment is imperative if the patient is to survive. In patients suffering from drug overdose, therapy is best administered when the drug ingested is known. It is therefore mandatory that the physician have available to him techniques which provide rapid and unambiguous identification of drugs present in the human body.

The Massachusetts Institute of Technology Center, in collaboration with Beth Israel Hospital, has used a mass spectrometer coupled to a gas chromatograph and a computer to identify drugs present in the human body. By analyzing blood, urine and other body fluids of patients suffering from drug overdose, the Center is able to positively identify the ingested drug in a matter of hours, and thus allow rapid therapy. The Center has successfully used this technique in a number of cases where drug identification methods used formerly proved insufficient. This work has stimulated similar attempts in other settings throughout the Nation such as the Mass Spectrometry Center for the Research Triangle Region, the Battelle Memorial Institute, and Arthur D. Little, Inc., and may lead to the development of exportable versions of this system that can become available within any major hospital setting.

Mental retardation: Some of the more significant advances toward preventing mental retardation has been made from the knowledge about inborn errors of metabolism. The error often consists of a missing or deficient enzyme system which impairs the delicately balanced breakdown and utilization of body chemicals necessary for normal development. Phenylketonuria and galactosemia are examples of such metabolid disorders. Research at the Michigan State University Mass Spectrometry Facility is aimed at identifying other metabolic disorders, particularly those that relate to lipid metabolism. Lipids isolated from skin cell cultures and from blood of mentally retarded children suspected of having defects in lipid metabolism are being examined for structural irregularities. The Facility's gas chromatograph-mass spectrometer system has proved uniquely applicable for this study, since only micrograms of lipids are available for analysis. The information on the structure of the various lipid metabolites gained from this work will aid in the indentification of metabolic errors and in the design of the treatment for these disorders.

Biological Materials Preparation Resources

These resources provide scientists with otherwise unobtainable biological materials such as enzymes, nucleic acids, and various subcellular organelles and whole living micro-organisms such as viruses, bacteria, and human cell lines. In addition, the resources develop new chemical and engineering methodologies for upgrading the efficiency and capabilities of the resource. Much of the work aimed at studying the basic life processes such as DNA synthesis and related processes in biochemical genetics is highly dependent on resources of this type. Also studies that require large quantities of purified biological materials are dependent on these resources. The testing of various enzymes for possible antitumor action falls in this class. For example, the isolation of a specific enzyme known to inhibit growth in some tumor lines from a specified bacterium is being done for Yale University by the New England Enzyme Center. Through a large-scale fermentation process the Center was able to produce sufficient quantities of the enzyme so that Yale investigators will be able to test the effects of this enzyme on various mouse tumor lines. These studies may eventually lead to the design and production of new antitumor drugs.

Electron Microscopy Resources

The Country's first one million volt electron microscope dedicated to biomedical research is being installed at the University of Wisconsin with funds awarded by the Biotechnology Resources Program. Completion of the microscope is expected in F.Y. 1972. One of the major endeavors of the resource will be the study of chemosomal fine structure and its relation to heredity and inherited disease in the human. This new facility will enable scientists to obtain information on the detailed structure of living material not available before. It represents an important emerging technology now becoming available to life scientists.

Program Plans in 1971 and 1972

The proposed budget for the Biotechnology Resources Program is $10,117,000, an increase of $500,000 over F.Y. 1971. The funds for F.Y. 1972 are expected to support 46 resources. The projects to be supported are in the areas of on-line computer development, mass spectrometry, nuclear magnetic resonance, high voltage electron microscopy and other techniques concerned with the characterization of molecular structure and function of its relationship to human disease. The increase of $500,000 will help offset the increased costs of providing these sophisticated resources. Additionally, it will allow for a limited increase in the scope of projects supported in selected areas of biotechnology such as electron microscopy.

Animal Resources

The goal of the Animal Resource Program is to develop and provide resources with which the biomedical scientist can develop knowledge for prevention and control of disease in man through experimentation with living systems. The importance of animal resources in reflected in the fact that 57 percent of National Institutes of Health supported research project grants require the use of animals. Animal experiments have been crucial in developing the vast majority of health care advances of which several examples are heart surgery; cardiac pacemakers; vaccines against viral diseases; drugs to control diabetes, tuberculosis, malaria, and many other diseases; and modern understanding of nutrition. In many of these projects the availability and quality of an appropriate animal model is a critical factor in the experiment. The objective of providing quality animal resources is being met through(1) the Primate Research Centers Program, a specialized national resource that seeks to extend studies on primates to the diseases of man by providing sources of healthy primates in the United States and the proper environment in which to undertake such studies; (2) the Laboratory Animal Medicine Program that supports development of animal model resources and improvement of institutional animal resource programs, and (3) training and fellowship programs to provide an adequate number of specialists for research and service in laboratory animal science and medicine.

Primate Research Centers

The objective of the Primate Research Centers Program is to provide a unique research environment where scientists from many disciplines can conduct biomedical and behavioral research using the nonhuman primate as the experimental animal. This is accomplished by providing grant support for the operation of the seven centers, established in the early 1960's with Federal funds. Conservatively, the current investment in land, buildings, capital equipment and animals in each center is valued at $5,000,000 or a total of $35,000,000.

The nonhuman primate is biologically and behaviorally closer to man than any other animal, and is affected, sometimes uniquely, with many diseases similar to man. Therefore, the possibility of successfully applying information gained from nonhuman primates to man is higher than that obtainable with any other animal. The seven primate research centers collectively have one of the largest and most varied collections of nonhuman primates found anywhere in the world. Currently, some 7,700 animals representing 57 species are available in the centers for use in research by more than 100 center staff scientists and some 200 collaborative scientists from many institutions. Some of the important research areas where nonhuman primates are effectively and increasingly being utilized are: the effects of malnutrition on childhood development, reproductive physiology and population control, alcohol addiction, mental health and mental retardation and a number of others in the biological and behavioral sciences.

The following are examples of studies conducted at several of the primate centers:

Alcoholism: For the first time, an animal model of alcohol-induced physical dependence has been experimentally produced in man's close biological relative--the chimpanzee. Preliminary results indicate that 8-10 consecutive weeks of relatively high alcohol consumption can produce mild to severe withdrawal symptoms when alcohol intake is abruptly terminated. Work during the coming months will be devoted to determining what factors are critical in producing and treating this condition which may effect an estimated 2-3 million persons in the United States each year.

Effects of Infant Malnutrition on Brain Development: A new research program has been initiated at one center designed to determine how protein deprivation during the critical early stages of growth affects the development of the central nervous system and the psychological behavior of children. Preliminary results indicate that infant monkeys maintained on a low protein diet for the first year of life do not compete favorably with well-nourished peers. This multidisciplinary effort will attempt to relate the effects of early nutritional deprivation on behavior to specific chemical, biochemical, and structural changes in the growing brain and should lead to an understanding of how malnutrition affects these changes.

Hookworm Disease: The hookwork still remains an important cause of morbidity in the tropics and is considered one of the important retarding influences on community development. Many aspects of hookworm disease have been difficult to study in the laboratory due to the lack of a good experimental system. Recent studies have shown that certain primates can be infected with the human hookworm and that the parasite behaves in primates essentially as it does in man. Therefore, laboratory studies using monkeys and apes as experimental models will assist in developing a better understanding of hookworm disease, and the significance of the hookworm in the production of anemia.

Fertility Control: Reproductive biology studies are being undertaken in five of the seven centers and extensive programs in population control are underway at two centers. Recent studies have produced three interesting findings--(a) the administration of low doses of progesterone over a short interval to female rhesus monkeys will inhibit ovulation by preventing the release of pituitary ovulating hormone; (b) the administration of testicular homogenate to mature male chimpanzees and rhesus monkeys results in testicular degeneration, and (c) impregnation of silastic intrauterine devices with progestin will significantly reduce the rate of explusion when these devices are placed into the uterine cavity of various female mammals. These and other studies are leading to a better understanding of human reproductive biology and techniques for controlling population.

Program Plans in 1971 and 1972

The $10,500,000 requested in 1971 and 1972 will support the operation of the seven primate research centers.

Laboratory Animal Medicine and Vivarial Sciences

The objective of the Laboratory Animal Medicine and Vivarial Sciences Program is to significantly improve the capability of institutional animal resources to serve medical research and education programs. This mission is accomplished through grants for support of special animal colonies that are of unusual nature and special value for certain types of research; disease diagnosis and control; research related to improving animal health and care; studies directed to enhancing the usefulness of animal models for research; and general improvement of management and accommodations for institutional animal resources.

Laboratory Animal Disease Diagnosis and Control: An important facet of research utilizing experimental animals is assurance that the animals are in an optimal state of health. This basic goal is dependent upon the ability to recognize and evaluate intercurrent laboratory animal diseases. Diagnostic resources are currently supported at 19 institutions where they underpin over $80,000,000 invested in research projects utilizing animals. The resource laboratories have not only served as the basic support for the animal health program, but have provided new information on disease processes and the cause of laboratory animal diseases. A further spinoff has been the elucidation of new laboratory animal models of human disease. Examples of these activities include detailed studies of a devastating disease outbreak in laboratory stocks of sparrows caused by canary pox virus; the diagnosis and control of bacterial pneumonia in monkeys used for the study of malaria; the recognition of naturally occurring malignant lymphoma as a complication in a drug evaluation project utilizing mice; and the diagnosis of diabetes in the South African hamster thereby identifying a valuable animal model to study this disease.

Animal Welfare: This Program has contributed significantly to animal welfare through disease control programs and historically has assisted a number of institutions in meeting the standards of the Laboratory Animal Welfare Ace of 1966 (P.L. 89-544). With the enactment of the much broader Animal Welfare Act of 1970, there will be an increased requirement for larger and more comfortable animal cages, renovations, cagewashers and sanitizing equipment, and better trained professional and technical personnel to meet the standards promulgated under the act. We know from information obtained through a comprehensive survey of animal facilities and resources that many institutions will be required to expend significant sums of money to meet the standards likely to be promulgated under the 1970 Act. These institutions can request financial assistance from the Animal Resource Program for those purposes related to the quality care of animals used for biomedical research.

Special Animal Colonies: An important area of this Program relates to the support of a number of special colonies which have proven to be quite valuable in human health related research. In most cases, animals from such colonies are available to qualified researchers from other institutions upon request. A case in point is the provision of over 1,200 highly inbred rabbits (representing 14 strains and 14 specific genotypes) to 84 investigators during the past several years from one colony supported by this Program. This particular colony provided genetic models for study of glaucoma, spina bifida, anemia, ataxia, and epilepsy. Examples of other special animal colonies highly useful in research include obesity-prone rats, leukemia cattle, germfree rats and mice used in air pollution research, and inbred guinea pigs of special usefulness in immunology research.

Institutional Primate Colonies: Six institutional primate resources will be supported under this program. Nonhuman primates are maintained in specialized facilities under optimal conditions of animal care and medical supervision where they are made available for multi-disciplinary types of biomedical research. The resource grant also contributes to the economy of research using primates by providing a framework for the multiple or sequential use of these expensive animals. These resources are currently being utilized in over 140 discrete projects, including the areas of reproductive physiology and fetal development, neonatal asphyxia, hepatitis and organ transplantation.

Primate Supply and Breeding: Because of the ever-dwindling availability of certain species of nonhuman primates from their native habitat sources, there is a critical need to assure a future supply of such animals for many biomedical research areas. A study will be initiated to identify those species of nonhuman primates of relevance to biomedical research which are in greatest danger of depletion for accession from native sources. Further, studies will be required to clearly demonstrate the feasibility of commercial domestic breeding and rearing of selected species.

New Animal Research Models: Studies continue to be supported to establish anatomic, biochemical, behavioral and physiological baselines on colonies of animal species which have exhibited the potential of developing into valuable research and educational resources. Such data has significantly advanced the use of miniature swine as a research model in a number of investigative areas, including alcholism, nutrition, microbiology, dentistry, reproductive biology, lipid metabolism, genetics, physiology and social behavior. Adaptation and characterization studies on new species of artic wild rodents (e.g., lemmings) may enhance their usefulness in studies of physiological adaptation, hibernation, energy metabolism, cold acclimatization and middle ear infections. Squirrel monkeys have been established as an important model for study of atherosclerosis. As a result, studies are underway to determine the genetic control of blood cholesterol and the effects of regular exercise (jogging) on development of atherosclerosis and coronary artery disease.

Program Plans in 1971 and 1972

The $4,474,000 requested for 1971 and 1972 will support approximately 64 animal resource projects. Thirty-one of these projects in 1971 and 26 in 1972 are for support of special colonies or development of animal disease models. Thirty-three of the projects in 1971 and 38 in 1972 are for improvement of efficiency and effectiveness of institutional animal programs through disease diagnosis and control, better scientific management, improved physical accomodations, and research related to improved methods of animal care, environmental control, and disease control.

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
Total fellowships....................	$126,000	$126,000	---

The increasing sophistication of animal resources for health-related research requires personnel with highly specialized training. It is the purpose of the Fellowship program to provide this training. The goal of the program is to provide an adequate number of specialists for research and service in laboratory animal science and medicine. The Division anticipates that people with demonstrated ability in laboratory animal medicine will be given fellowships in special areas such as surgery, anesthesiology, pathology, virology, primatology, biochemistry, etc.

Program Plans in 1971 and 1972

The $126,000 available in 1971 will provide support for 14 fellowships at the postdoctoral level. The $126,000 requested for 1972 will provide continued support for seven existing fellowships and seven new fellowships.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting............	7	$71,000	7	$70,000	--	-$1,000
b. Competing...............	1	13,000	--	---	-1	-13,000
2. New.........................	6	42,000	7	56,000	+1	+14,000
3. Total fellowships.............	14	126,000	14	126,000	--	---

Fellowships (by type of program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Postdoctoral..................	9	$74,000	10	$84,000	+1	-$10,000
2. Special.......................	5	52,000	4	42,000	-1	-10,000
3. Total fellowships.............	14	126,000	14	126,000	--	---

Fellowships Program Analysis

Program Area	1971 Estimate	1972 Estimate	Increase or Decrease
1. Resource Animal Biochemistry...	$5,000	$10,000	+$5,000
2. Resource Animal Comparative Pathology...................	73,000	46,000	-27,000
3. Laboratory Animal Science......	48,000	40,000	-8,000
4. Resource Animal Parasitology...	---	10,000	+10,000
5. Resource Animal Microbiology...	---	20,000	+20,000
6. Total fellowships.............	126,000	126,000	---

Training Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
Total training grants...............	$352,000	$352,000	---

Training grants are awarded to academic institutions to provide postdoctoral training in laboratory animal medicine. The training is intended to prepare individuals to provide professional care of the many species of laboratory animals, to manage central animal resources, and to give special assistance to investigators through superior knowledge of laboratory animal biology and understanding of research methods. In addition, the trainees are prepared to participate in the teaching of graduate students and young investigators and to pursue their own research interests either as independent investigators or as a member of a research team. Twenty-six trainees are currently enrolled in nine training programs. The usual training period is two to three years.

Forty-six trainees have completed training since the inception of training grants in laboratory animal medicine. Twenty-six of these are employed by medical schools and fifteen by other academic, research, or governmental organizations. The majority (27) are functioning as directors or staff members of a vivarium, sixteen are engaged in research or are obtaining additional training, and three are engaged in public health and other activities. Although the number of graduates is relatively small, they have filled vitally needed leadership roles in the field of laboratory animal medicine. The rapid progress in developing strong central animal resource programs and in expanding the "state of the art" may be attributed in large part to the influence of these highly trained individuals. A further accomplishment realized from this Program is that it is serving as a catalyst to develop special courses at the undergraduate level in schools of veterinary medicine.

Program Plans in 1971 and 1972

The $352,000 requested for 1972 will provide continued support to eight training programs in the field of laboratory animal medicine. While this will represent a decrease from nine to eight active programs, it is estimated that approximately the same number of trainees (30) will be supported. This is possible since most of the current programs have many approved, but unfunded, trainee positions.

Distribution of Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
Graduate	No.	Amount	No.	Amount	No.	Amount
1. Continuations:						
a. Noncompeting..............	9	$352,000	5	$202,000	-4	-$150,000
b. Competing.................	--	---	3	150,000	+3	+150,000
2. New....	--	---	--	---	--	---
3. Total training grants..........	9	352,000	8	352,000	-1	---

Collaborative Research and Development

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...............	2	$27,000	2	$28,000	--	+$1,000
Other expenses...............	--	1,359,000	--	1,363,000	--	+4,000
Total......................	2	1,386,000	2	1,391,000	--	+5,000

This activity supports research in collaboration with Federal and non-Federal institutions through contracts.

Program Plans in 1971 and 1972

The funds available in 1972 will continue to be used to support research contracts in the areas of chemical/biological information-handling systems and the regular research resource programs of the Division. Emphasis will continue to be placed on the development and evaluation of computer-based tools with which the design and testing of new drugs might be facilitated and with which our store of basic knowledge about chemical substances and their biological effects can be increased. The goal here is a single computer-based research resource which can be shared by geographically separate scientists and which can augment their individual cognitive and logistical capabilities for perusing analyzing, interpreting, and communicating laboratory and clinical data. In addition, special evaluation and development contracts are supported in the other regular resource programs of the Division.

The increase of $5,000 will provide funds for the annualization of 1971 pay increase costs.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...............	52	$743,000	52	$856,000	--	+$113,000
Other expenses...............	--	312,000	--	297,000	--	-15,000
Total......................	52	1,055,000	52	1,153,000	--	+98,000

This activity supports the scientific and administrative staff of the Division's Special Research Grant Programs and General Research Support Programs. This includes program planning and development; and review and evaluation of grant applications for presentation to the National Advisory Research Resources Council. Other duties of this activity include liaison with applicants, grantees, other components of the NIH and DHEW, and advisory bodies, and interested organizations.

The increase of $98,000 includes $77,000 for annualization of 1971 pay increase costs, $7,000 within-grade increases, $11,000 for payment to the "National Institutes of Health management fund" for centrally furnished services, and $3,000 for one extra day of pay.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...............	30	$474,000	30	$509,000	--	+$35,000
Other expenses...............	--	228,000	--	228,000	--	---
Total......................	30	702,000	30	737,000	--	+35,000

This activity is responsible for the overall direction, administration, planning, evaluation and data analysis of the several grants-in-aid programs of the Division of Research Resources

The increase of $35,000 includes $16,000 for annualization of 1971 pay increase costs, $4,000 within-grade pay increases, $6,000 for increased Federal Telecommunication System charges, $2,000 for one extra day of pay and $7,000 for payment to the "National Institutes of Health management fund" for centrally furnished services.

Program Purpose and Accomplishments

Activity: General Clinical Research Centers (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$38,004,000	Indefinite	--	$39,004,000

Purpose: In 1959, Congress recommended the establishment of the General Clinical Research Centers Program as a result of its recognition of the need and desire to create centralized facilities to provide highly integrated research opportunities and services to large numbers of investigatory and research groups around the nation. The program which grew from the broad Congressional mandate has a number of discrete but highly integrated objectives: (1) to provide facilities and personnel sufficient to establish throughout the Nation the optimal environment for human clinical investigation; (2) to promote the rapid application of laboratory and basic science research advances to the immediate care of the clinically diseased individual; and (3) to increase the total body of knowledge of the etiology, natural history, therapy and prevention of human disease.

Explanation: Federal grants are made to fund the cost of establishing and operating clinical centers which are physically discrete research hospital units usually located in university-affiliated hospitals. They provide the essential bed space for clinical research, the laboratory equipment necessary for such research, and are staffed by personnel trained in clinical research techniques. Investigators trained in all areas of medical science utilize these centers. Research in major disease areas include renal disease, cardiovascular diseases, infectious diseases, allergy and immunology, dermatology, cancer, and diseases contributing to high infant mortality rates.

Accomplishments in 1971: In 1971, 80 centers received support. Studies conducted at the centers emphasized population control, cancer therapy, transplantation research, and drug treatment of Parkinson's Disease.

Objectives for 1972: The estimate for 1972 will provide continuing operation for approximately 80 centers. The $1,000,000 increase will allow the activities to be maintained at close to present operating levels with some diversification to facilitate research on ambulatory patients.

Activity: Biotechnology Resources (Public Health Service Act, Title III, Part A)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$9,617,000	Indefinite	--	$10,117,000

Purpose: The Biotechnology Resources program provides the Nation's life scientists with sophisticated technologies for research, education, and patient care by facilitating access to highly specialized instruments and methodologies and their associated expertise.

Explanation: Grants are made to institutions to conduct a wide variety of health-related research within a university, research institution or region with emphasis on computation, mass spectrometry, nuclear magnetic resonance spectroscopy, high voltage electron microscopy and biological materials preparation. The biotechnology resource is characterized by three component activities: (a) the rendering of services to biomedical scientists whose specific research projects are funded by the categorical institutes of the NIH; these services include access to both instrumentation and expert consultative and other technical assistance, (b) the pursuit of research and development directed toward upgrading existing resource capabilities and the state of the technology as it relates to human disease, and (c) the providion of a base for the training of biomedical scientists in the appreciation and use of the technology. This mode of support makes it economically feasible to provide biomedical scientists supported by other programs of the NIH with both (a) urgently needed scientific capabilities that could not be justified or fully utilized on an individual basis, and (b) the expertise necessary for the most efficient and effective utilization of such expensive and advanced research tools.

Accomplishments in 1971: In 1971 support was provided to 47 resources: 33 Biomedical Computer Resources, 10 Biomedical Instrumentation Resources, three Biological Materials Preparation Resources, and one High Voltage Electron Microscopy Resource. During 1971, 1,867 investigators utilized the computer, including assistance in the diagnosis of heart disease, monitoring the critically ill, and studies of child development. 273 investigators utilized the Biomedical Instrumentation Resources to elucidate the molecular structure of chemical substances that comprise or interact with living organisms including research on chemotherapeutic agents, antibiotics, and the structure and function of normal and abnormal hemoglobins. 19,093 preparations were requested from the Biological Material Preparation Resource.

Objectives for 1972: During 1972, support will be provided to the 46 existing resources.

Activity: Scientific Evaluation (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$215,000	Indefinite	--	$215,000

Purpose: This activity provides support for the study sections and preliminary review committees used by the Division to provide scientific merit review of grant applications.

Explanation: These study sections and committees, composed of outstanding authorities in the various fields of medical research, are responsible for the scientific peer evaluation of all research grant applications, and they forward their recommendations to the National Advisory Research Resources Council.

Accomplishments in 1971: Provides support for the review of grant applications and program plans for the Division's several branches.

Objectives for 1972: The $215,000 requested for 1972 will provide support for review of applications for new and competing grants for General Clinical Research Centers, Biotechnology Resources, Animal Resources and Training grants, and the Chemical Biological Information Handling program.

Activity: Animal Resources (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$14,974,000	Indefinite	--	$14,974,000

Purpose: Animal Resources includes the Laboratory Animal Medicine and Vivarial Sciences program and the Primate Research Centers program. The Laboratory Animal Medicine and Vivarial Sciences program assists institutions in providing animal resources required for medical research and education. The Primate Recearch Center program provides a unique research environment where scientists from many disciplines can conduct biomedical and behavioral research using the nonhuman primate as the experimental animal.

Explanation: Grants for Laboratory Animal Medicine and Vivarial Sciences are made to institutions for special animal colonies, research related to improving animal health and care, disease diagnosis and control, studies directed to enhancing the usefulness of animal models for research, and general improvement of management and accommodations for institutional animal resources. The importance of animal resources is reflected in the fact that over 57 percent of the National Institutes of Health's supported research grants require the use of animals.

The seven Primate Centers established in the early 1960's with Federal funds receive operating support through annual grants. The nonhuman primate is biologically and behaviorally closer to man than any other animal, and is affected, sometimes uniquely, with many diseases similar to man. Therefore, the possibility of successfully applying information gained from nonhuman primates to man is higher than that obtainable with any other animal.

Accomplishments in 1971: In 1971, 71 animal resources received support including seven primate research centers. The Laboratory Animal Medicine and Vivarial Sciences program will provide support for 31 projects for special colonies or development of animal disease models, and 33 projects for improvement of efficiency and effectiveness of institutional animal programs.

Objective for 1972: It is anticipated the program for 1972 will support approximately 71 animal resources.

Activity: Fellowships (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$126,000	Indefinite	--	$126,000

Purpose: The increasing sophistication of animal resources for health related research requires personnel with highly specialized training. The purpose of the fellowship program is to provide this training.

Explanation: The goal of the Fellowships program is to provide an adequate number of specialists for research and service in laboratory animal science and medicine. It is anticipated that individuals with demonstrated ability in laboratory animal medicine will be given fellowships in special areas such as surgery, anesthesiology, pathology, virology, primatoloty, biochemistry, etc.

Accomplishments in 1971: There were 14 fellowships awards in 1971, 9 postdoctoral, and five special.

Objectives for 1972: Funds requested for 1972, the same dollar level as in 1971, will support 14 fellowships in 1972, 10 postdoctoral, and four special.

Activity: Training (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$352,000	Indefinite	--	$352,000

Purpose: There is a critical need for trained specialists in laboratory animal medicine. The impetus of the Laboratory Animal Welfare Act (P.L. 89-544) and pending legislation to further refine animal care imposes an additional obligation on the Federal government and scientific community to provide adequately trained laboratory animal specialists.

Explanation: Training grants are awarded to academic institutions to provide postdoctoral training in laboratory animal medicine. The training is intended to prepare individuals to provide professional care of the many species of laboratory animals, to manage central animal resources, and to give special assistance to investigators through superior knowledge of laboratory animal biology and understanding of research methods. In addition, trainees are prepared to participate in the teaching of graduate students and young investigators and to pursue their own research interests either as independent investigators or as a member of a research team.

Accomplishments in 1971: In 1968 the National Academy of Sciences through its Institute of Laboratory Animal Resources conducted a survey which indicated that 374 veterinary specialists in laboratory animal medicine or pathology are employed in animal facilities in Public Health Service grant eligible institutions; an additional 109 are needed presently; and 338 more will be needed by 1973. The fact that a large number of medical schools and research institutions simply cannot find any such specialists is causing staffing problems for ongoing resource programs and all research programs which use animals.

There have been 46 graduates of the nine existing training programs. Twenty-six of these are employed by medical schools and 15 by other academic, research or governmental organizations.

In 1971, nine training grants were funded providing support to approximately 26 trainees at the graduate level.

Objectives for 1972: Funds requested for 1972 will provide the same dollar level as in 1971, and will support eight awards which will result in the training of approximately 30 trainees at the graduate level in the field of laboratory animal medicine.

Activity: Collaborative Research and Development (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
2	$1,386,000	Indefinite	2	$1,391,000

Purpose: To support research in collaboration with Federal and non-Federal institutions through the contract mechanism.

Explanation: Implementation of the collaborative programs are largely through contracts with universities, industrial facilities and other Federal agencies.

Accomplishments in 1971: In 1971, support through research contracts was provided in the areas of chemical/biological information handling, special research resources, and laboratory animal care. Major emphasis was placed on the development and evaluation of computer-based tools with which the design and testing of new drugs might be facilitated and with which our store of basic knowledge about chemical substances and their biological effects can be increased. Developments include computer-driven display systems for studying molecules in two or three dimensions and sophisticated file systems for handling the heterogeneous types of data associated with them. Particular attention is addressed to helping individual scientists manipulate, analyze and communicate data they amass in the course of their research.

Objectives for 1972: Program plans for 1972 will continue to support research contracts in the areas of chemical/biological information handling, and the regular research resource areas.

Activity: Review and Approval (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
52	$1,055,000	Indefinite	52	$1,153,000

Purpose: Provide support for the scientific and administrative staff of the Division's special research grant programs and General Research Support programs.

Explanation: Funds are used for salaries and related cost for staff necessary for the program planning and development, review and evaluation of grant applications for presentation to the National Advisory Research Resources Council and the National Advisory Health Council. Other staff duties include liaison with applicants, grantees, other components of the NIH and DHEW, and advisory bodies, and interested organizations.

Accomplishments in 1971: Administrative review and processing of application and grant awards of the special research grant programs of the Division.

Objectives for 1972: In 1972, this activity will continue to provide the scientific and administrative support required for the review of all of the Division's grants at the same level as 1971.

Activity: Program Direction (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
30	$702,000	Indefinite	30	$737,000

Purpose: This activity provides the overall leadership required for the administration, direction and coordination of the several programs of the Division of Research Resources.

Explanation: Funds are used for salaries and related cost for staff of the immediate Office of the Director, Executive Officer, Administrative Office, Budget Office, Program Analysis Office and Information Office.

Accomplishments in 1971: Overall direction and administration of the Division's programs as well as review of current and proposed operations.

Objectives for 1972: In 1972 this activity will continue to provide the overall direction and administration of the Division's programs at the same level as 1971.

DIVISION OF RESEARCH RESOURCES

STATEMENT OF DR. THOMAS BOWERY, DIRECTOR ACCOMPANIED BY DR. JAMES O'DONNELL

BUDGET REQUEST AND 1971 APPROPRIATIONS

Senator MAGNUSON Research resources.

Go right ahead Dr. Bowery.

For the record, $66,431,000 last year; $68,069,000 this year.

Dr. BOWERY. That is correct, sir.

DIVISION RESPONSIBILITIES

The Division of Research Resources (DRR) assists institutions engaged in biomedical research and helps to foster the NIH categorical institutes programs through two basic types of grant support: (1) resource grants supporting discrete institutional or regional centers concerned with human clinical investigations, biotechnology development and application, research utilizing animals and (2) general research support grants designed to be expended by the recipient institutions with the maximum flexibility across the full spectrum of life science research. The discrete research resources represent focuses of scientific and technical activity operating on a scale that is generally unattainable via ad hoc collection of other types of research support.

GENERAL RESEARCH SUPPORT GRANT FUNDS

The general research support grant funds give research administrators a means to exploit unexpected developments and to counter the pressures toward fragmentation that inevitably accompany the project grant system.

The achievements of DRR activities are as multifaceted as biomedical research, itself, but the bulk of them can be grouped into two main classes.

BUDGET ACTIVITIES OF NIH RESEARCH INSTITUTES AND DIVISIONS

Senator MAGNUSON. Now, Dr. Marston, so that we will get the record clear and it will clear it up for me and Senator Cotton, too, you have research institutes in your budget, research grants in the NIH budget.

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Research grants, competing and noncompeting, general research support grants, multidisciplinary centers, special programs, research training programs, intramural research and collaborative research, other Institute and special cancer research.

What Dr. Bowery is talking about is a different thing, is it not?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Clear that up for the record because we have all these items in here.

Dr. MARSTON. You are looking at a summary of the budget activities found in the research institutes and divisions of NIH. Their funds are categorized under the titles you mentioned, but the titles do not represent appropriations.

Our appropriations are made, Institute by Institute, from the Cancer Institute to the Heart Institute, and so on, as well as for the Division of Biologics Standards, the Fogarty Center and Dr. Bowery's Division of Research Resources. The summary table is simply to show you the aggregate total for all of the research grants and other functions for all of the research institutes and divisions. This aggregate total equals the amounts requested in the actual appropriation structures that you are being asked to approve for heart, lung, cancer, arthritis, research resources, and so forth.

DIVISION FUNDING ALLOCATION

Dr. Bowery. I can give you a brief statement as to the amount of money allocated our Division totally for our program.

Senator Magnuson. But you have $68 million.

Dr. Bowery. Plus $49.2 million for the general research support program which is money transferred from the various categorical institutes into the general research support program.

RESEARCH GRANTS: CENTRAL GRANT REFERRAL SYSTEM

Senator Magnuson. Who handles the research grants by each Institute?

Dr. Marston. They are handled by each Institute, except that we have a central system that receives all grant applications and coordinates the processing and review of those applications.

Mr. Miller. Mr. Chairman, the table you are looking at is merely a summary for your information.

You do not appropriate money in accordance with that page, but rather with the one that follows it. In case you want to know how much research grant money has been requested for all the Institutes, you need only to refer to this summary. The appropriations are listed on the two following pages.

Senator Magnuson. The NIH research program was $1,166 million last year, and $1,291 million this year.

Does that include the $68 million you are talking about?

Dr. Bowery. Yes, sir.

GENERAL CLINICAL RESEARCH CENTERS

Senator Magnuson. For instance, as I understand it, you give grants to general clinical research centers.

Dr. Bowery. That is correct, sir.

Senator Magnuson. Whereas, the Institutes individually don't do that.

Dr. Marston. No, sir.

Senator Magnuson. How many are there of those?

Dr. Bowery. Approximately 80 general clinical research centers.

Senator Magnuson. What kind of work do they do?

Dr. Bowery. We support the basic clinical research resource, that is the beds, core laboratories, and the dietary and nursing staffs. Some of the primary leaders in medicine and the categorical institutes use these resources. They carry out their clinical research in these facilities.

Senator Magnuson. If you have one of these general clinical research centers, each of the Institutes can use them if they have a special reason to want to use them; is that right?

Dr. Bowery. That is correct.

For instance, at the University of Washington where we have a general clinical research center it is used by investigators supported by the categorical institutes to carry out clinical research on patients.

Senator Magnuson. All right.

DIVISION ACHIEVEMENTS

Dr. Bowery. I will now continue my opening statement. The achievements of DRR-sponsored activities are as multifaceted as the biomedical research itself, but the bulk of them can be grouped into two main classes: (1) creation of specialized research settings for use by grantees and contractors of the NIH categorical programs and (2) the generation of new knowledge to aid the general progress of biomedical science.

Each of these DRR contributions serves as a catalyst for the regular NIH project grants system. Each of these contributions makes NIH's grantee institutions ever more able to face the challenges before them.

Support to Categorical Programs

Since the DRR by definition exists to advance the categorical programs of the NIH, the second-order effects of its funding are even more important than the primary ones. That is, to assess the full impact of the DRR-sponsored activities, one must examine not only the resources, themselves, but also the consequences of having the resources available.

The most important class of second-order effects of the discrete research resource is the experimentation which would be essentially impossible to perform if the resources did not exist. Because DRR sponsors the development and maintenance of advanced computer systems, clinical resources, primate centers, and the like, grantees and contractors of the NIH categorical programs have, at any given point of time, a much richer selection of options for pursuing their studies. Because research resources are routinely institutional or regional in scope they make possible a style of experimentation that is generally out of reach by the standards of individual research projects. By allowing experts in a new technology to operate in behalf of an entire community of scientists in a given institution or region, the research resource concept can readily accommodate levels of sophisticated instrumentation and staffing that could rarely, if ever, be justified on an individual project basis.

Senator Magnuson. What you are saying, then, is if the Cancer Institute wanted to have some work done and there was no special contractor who could do this, they could say to the general clinical research center, you go ahead.

Dr. Marston. In a sense, that is correct. A research investigator with a cancer grant—or a grant from any other institute—can make use of the general clinical research center facilities. Otherwise, we would have something near chaos. Each institute might find it necessary to establish small clinical research centers for heart, cancer, and arthritis, for example, in order to provide needed resources. This division makes it possible to approach the problem in an orderly fashion.

TRAINING

Senator MAGNUSON. Do you have any training in this?

Dr. BOWERY. We have a very small training program.

Senator MAGNUSON. I can understand that because of the nature of the place.

Dr. BOWERY. Our training activity is located in our animal resources program to train the type of animal workers that back up the categorical institutes.

Senator MAGNUSON. You have $352,000 for training.

Dr. BOWERY. That is correct.

Senator MAGNUSON. You have only $126,000 for fellowships.

Dr. BOWERY. That is correct, all in the animal resources program.

Senator MAGNUSON. The big amount is in general clinical research centers, the maintenance——

Dr. BOWERY. $39 million.

RESOURCE PROGRAMS

Senator MAGNUSON. Then the animal resources for $15 million.

Dr. BOWERY. $15 million and in our biotechnology resources programs, which is mainly computer centers, approximately $10 million.

Senator MAGNUSON. Ten for next year.

Dr. BOWERY. That is correct. This whole set of resources is complementary to the institutes. In addition to the research resources which are complementary to all of NIH programs there is the general research support program (GRS) which provides flexible funds which are made available to grantee institutions. We think these funds are a necessary element in the total support system and one through which an institution can generate its own ideas, forge new directions, innovate programs and support fledgling ideas and the people willing to undertake them.

Hopefully, the GRS program is the linkage that makes the institution a cohesive health research and research training entity rather than a set of discrete programs and projects, and enable the institution to develop and maintain the capability for quality.

Thus, with these two modes of support, the DRR enhances the capability of the categorical programs, in their fight against disease and disability.

You may remember there was quite a bit of dialog yesterday with Dr. Rall, of the Arthritis Institute, concerning kidney transplantation. Some 70 percent of the early research involving kidney transplantation was carried out in the general clinical research centers supported by DRR.

Dr. Stetten, of the National Institute of General Medical Sciences, used to phrase "computers invaded medicine," and this helped to bring forth many of the exciting activities that were discussed with Senator Boggs. DRR supports some 33 computer centers around the country. These help the Institutes and give physical scientists the capability to utilize the resources by linking them up with the sciences capability that exists in the biological sciences for the advancement of medical science.

Also, it was mentioned this morning by Dr. MacNichol, of National Institute of the Neurological Diseases and Stroke; the use of various types of animal models and the need for higher quality and better care for animals. Our animal resource program offers institutional support through which animal models are developed, and higher standards of care and improvement for maintaining animals are being encouraged.

These are but a few examples drawn from yesterday's and this morning's testimony, which show how we interrelate our research resources with the categorical institute.

DEVELOPMENT OF GENERAL CLINICAL RESEARCH CENTER FACILITIES

Senator MAGNUSON. You have not built these centers, bricks- and mortar-wise, have you?

Dr. BOWERY. No, sir.

Senator MAGNUSON. You usually take a part of an existing facility; it could be in a university.

Dr. BOWERY. In the universities in the earlier days of the construction program, some portions of the clinical research centers were actually built with Federal funds. In most of them, we largely put in funds for alteration and renovation costs.

Senator MAGNUSON. That is right; it might be a wing. Lately, you haven't had any construction money for any of that, have you?

Dr. BOWERY. No. However, in the primate research centers program. there are seven centers in which the land was purchased and the physical facilities were built entirely with Federal funds.

PRIMATE BREEDING COLONY, HOLLOMAN AIR FORCE BASE, N. MEX.

Senator MAGNUSON. Senator Anderson and Senator Montoya have a letter which we will include in the record. They inform us that the Air Force is abandoning their primate breeding colony in New Mexico. They want to know why this facility could not be used; or are you taking any steps to utilize it, if you need it?

Dr. BOWERY. We are not taking steps to utilize it at this point, because the particular budget item for the primate research centers themselves has just about kept pace with the needs of the seven ongoing centers.

We estimate that the Holloman Air Force operation would run anywhere from a half million dollars to a million and a half dollars additional cost. The latest I have heard on this is that the Albany Medical College has worked with the Air Force to allow them to take over this facility. I believe that the Albany Medical College is then hoping to acquire a number of grants and contracts from many Federal agencies, sufficient to maintain and operate this facility.

Senator MAGNUSON. You wouldn't, naturally, want to take it over if you yourself didn't need it. Is the university taking it over?

Dr. BOWERY. I believe that Albany Medical College is planning to do so.

Senator MAGNUSON. Well, you could use that. You could give a contract to them; could you not?

Dr. MARSTON. Yes; but our problem is money.

Senator MAGNUSON. For the primates?

Dr. MARSTON. It should be put this way, in all fairness. We made an assessment that seven primate centers would, in general, fulfill the needs of the Nation. We have had some trouble in getting the dollars to keep those going, because this is the type of activity that you just can't go up and down on.

Senator MAGNUSON. We will see about that.

(The letter follows:)

LETTER OF HON. CLINTON P. ANDERSON, U.S. SENATOR FROM NEW MEXICO

United States Senate
COMMITTEE ON
AERONAUTICAL AND SPACE SCIENCES
WASHINGTON, D.C. 20510

April 7, 1971

Honorable Warren G. Magnuson
Chairman
Appropriations Subcommittee on Labor and HEW
1108 NSOB

Dear Maggie: ATTN: Mr. Harley Dirks

I am enclosing a statement with certain documents attached which I request to have placed in the record of hearings in connection with the budget of the National Institutes of Health or the National Science Foundation. In this statement I request funding for maintenance of the Primate Breeding Colony at Holloman Air Force Base in New Mexico for the next two years.

The Air Force was ordered to divest itself of this facility because, for the most part, it is excess to their needs and a good deal of research that was not Air Force related was being conducted there. Realizing the importance of this facility to the entire nation and to science and upon requests from many scientists and scientific research institutions, we proceeded to try to keep this intact and to find some research institute or government agency that would take it over and operate it for the benefit of the entire nation.

As you will see by the enclosed statement, this is a unique facility. There is probably no other like it in the entire free world. The Institute of Pathology and Toxicology under Dr. Frederick Coulston at Albany Medical College has concluded an agreement with the Air Force to operate this facility. Total operation costs for the laboratory and primate colony is $1,200,000 a year. There is no doubt from proposals that are being made for research at the institution that, within the next year or, at most, within the next two years, it will be entirely self-supporting. But, during that time we need approximately $500,000 a year to maintain the primate breeding colony.

I am not sure which agency would be the proper one to handle this item which is why I suggest that it be entered in the hearings in connection with either NIH or the National Science Foundation. I will leave it up to the committee to decide which would be the appropriate agency.

Dr. Frederick Coulston has advised me that he would be available to answer any questions or to testify before your committee if you desire him to do so.

When you have gone over the attached statement, I am sure you and your committee will recognize the importance of this primate colony, and I sincerely hope that funds will be provided as requested.

Sincerely yours,

Clinton P. Anderson

Clinton P. Anderson

CPA/wmg

Enclosures

United States Senate
COMMITTEE ON
AERONAUTICAL AND SPACE SCIENCES
WASHINGTON, D.C. 20510

June 28, 1971

MEMORANDUM

TO: Honorable Warren G. Magnuson, Chairman
Subcommittee on Labor, and Health, Education, and Welfare
of the Senate Appropriations Committee

FROM: Senator Clinton P. Anderson

RE: Funding for Care of Primates at Holloman Air Force Base,
New Mexico, through Fiscal Year 1972

This is a reminder of the statement I submitted to your Subcommittee requesting a special appropriation for the maintenance and care of the primate breeding colony at Holloman Air Force Base, New Mexico, through Fiscal Year 1972. In my statement, I went to considerable length in setting forth the background, history and work proposed to be done under the direction of the Albany Medical College. The College is signing the lease on June 30 to operate this facility on a non-commercial basis for the benefit of the entire nation.

Considerable research is now being conducted at the laboratory for the Department of Transportation and the Food and Drug Administration. Also, plans are being made to do work for the Environmental Protection Agency and other government agencies. However, the Albany Medical College cannot foot the entire bill for care of the primates during this first year (FY 1972).

I am sure I need not remind you that this is the only chimpanzee breeding colony of this type in the free world. Every animal has a complete medical and genetic record, and the primates are invaluable for medical and environmental research.

In my statement, I suggested that funds for care of these animals be put into the budget of either the National Institutes of Health or the National Science Foundation. Personally, I would prefer that the funds be put into the budget of the National Science Foundation since the National Institutes of Health operates one or two small primate colonies which are used for experimental purposes. They are not breeding colonies, however, and I would not want the laboratory at Holloman to become involved with these other groups.

Senator Ellender has requested the Air Force to continue the care of the primates until the HEW appropriation has been acted on.

Claude Wood of my office has followed this project for over a year and has kept Mr. Harley Dirks of your Subcommittee staff informed.

As I have stated before, Dr. Frederick Coulston of the Albany Medical College will be glad to discuss this operation with the Subcommittee members and/or staff at anytime.

CPA/wlc

NUMBER OF CENTERS

Now, you said you had 80 general research centers.

Dr. BOWERY. General clinical research centers.

Senator MAGNUSON. Do you plan any more under the 1972 appropriation?

Dr. BOWERY. Basically, we would like to allocate the funds to those centers that have the highest scientific priority. There are several centers that have received such high ratings, and currently are approved but unfunded. Depending on the final fiscal situation that presents itself in 1972, yes, we would like to fund a few more. However, we don't know at this point whether we can or not.

Senator MAGNUSON. I gather from what you say that you would like to either upgrade some or keep them at their high level, and that is about all you have.

Dr. BOWERY. The budget request is showing a million-dollar increase which is just enough to barely keep us in the inflationary market for this particular program.

Senator MAGNUSON. Yes; you have $1.6 million.

All right; thank you very much.

Dr. BOWERY. Thank you, Mr. Chairman.

PARTICIPATION IN INTERNATIONAL EYE FOUNDATION

Senator MAGNUSON. Oh, Dr. Marston, I forgot to ask the eye man, Dr. Kupfer—do you participate at all in the International Eye Foundation?

Dr. MARSTON. Let me get that information for you for the record.

Senator MAGNUSON. Yes. This is Dr. King's—you know Dr. King?

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. They are going to have to appear before the Foreign Relations Committee. I guess they get the American contribution through the Foreign Relations Committee. It is the same idea, it is an eye bank.

Dr. MARSTON. Let me find that out.

(The information follows:)

INTERNATIONAL EYE FOUNDATION

The purpose of the International Eye Foundation is to establish eye banks throughout the world which provide material for cornea transplants and to train local health personnel in techniques of cornea grafting. Cornea transplantation is a procedure that has already been well developed through research and tested in clinics. Since this is primarily a national service activity it would not fall within the responsibility of the National Eye Institute.

NATIONAL INSTITUTES OF HEALTH

JOHN E. FORGARTY INTERNATIONAL CENTER FOR ADVANCED STUDY IN THE HEALTH SCIENCES

Justifications

Appropriation Estimate

JOHN E. FOGARTY INTERNATIONAL CENTER FOR ADVANCED STUDY IN THE HEALTH SCIENCES

For the John E. Fogarty International Center for Advanced Study in the Health Sciences, [$3,582,000] *$3,319,000*, of which not to exceed $500,000 shall be available for payment to the Gorgas Memorial Institute for maintenance and operation of the Gorgas Memorial Laboratory.

Amounts Available for Obligation

	1971	1972
Appropriation............................	$3,582,000	$3,319,000
Real transfer from:		
"National Institute of Arthritis and Metabolic Diseases" (proposed transfer for increased pay costs)..	54,000	---
"National Institute of Neurological Diseases and Stroke" (proposed transfer for increased pay costs)..	30,000	---
Comparative transfer to: "Office of the Director".............................	-6,000	---
Comparative transfer from: 'National Cancer Institute".....................	22,000	---
Total, obligations.......................	3,682,000	3,319,000

Obligations by activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase Decrease Pos.	Increase Decrease Amount
	Grants:						
235	Research............	---	$ 520,000	---	520,000	---	---
236	Fellowships.........	---	1,077,000	---	739,000	---	-$338,000
237	Fogarty Scholarships.	---	170,000	---	170,000	---	---
238	International Center......	49	1,915,000	49	1,890,000	---	- 25,000
	Total, obligations........	49	3,682,000	49	3,319,000	---	- 363,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions	49	49	---
Full-time equivalent of all other positions......................	8	8	---
Average number of all employees	55	55	---
Personnel compensation:			
Permanent positions............	$ 676,000	710,000	+ 34,000
Positions other than permanent..	72,000	78,000	+ 6,000
Other personnel compensation....	5,000	5,000	---
Subtotal, personnel compensation	753,000	793,000	+ 40,000
Personnel benefits	89,000	93,000	+ 4,000
Travel & transportation of persons	193,000	193,000	---
Transportation of things.........	10,000	10,000	---
Rent, communications & utilities..	80,000	81,000	+ 1,000
Printing and reproduction........	40,000	40,000	---
Other services			
Payment to NIH Management Fund.	96,000	101,000	+ 5,000
Other.......................	506,000	427,000	- 79,000
Supplies and materials...........	50,000	54,000	+ 4,000
Equipment.......................	98,000	98,000	---
Grants, subsidies, and contributions................	1,767,000	1,429,000	-338,000
Total obligations by object.	3,682,000	3,319,000	-363,000

Summary of Changes

1971 estimated obligations	$3,682,000
1972 estimated obligations	3,319,000
Net change	-363,000

	Base		Change from Base	
Increases:	Pos.	Amount	Pos.	Amount
A. Built-in				
1. Annualization of 1971 pay increase costs	---	---	---	34,000
2. Extra days pay	---	---	---	4,000
3. Within-grade pay increases	---	---	---	11,000
4. FTS rate increase	---	---	---	1,000
Subtotal	---	---	---	50,000
B. Payments to NIH Management Fund for centrally furnished services	---	96,000	---	5,000
Total, Increases	---	---	---	55,000
Decreases:				
A. Program				
1. Fellowships	---	1,077,000	---	-338,000
2. International Center	---	1,819,000	---	- 80,000
Total, decreases	---	---	---	-418,000
Total, net change	---	---	---	-363,000

Explanation of Changes

Built-in-Increases--These increases will provide: $34,000 for annualization of 1971 pay increase; $4,000 for the extra day of pay; $11,000 for within-grade pay increases in 1972; and $1,000 for increased cost in 1972 of using the Federal Telecommunications system.

Program Decreases--The decrease of $338,000 reflects a reduction of 43 International Postdoctoral Fellowships. The decrease of $80,000 results from reduced program operations in the International Center.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act		
Title II - Administration Section 207 (g) Service Fellowships		
Title III - General Powers and Duties of Public Health Service		
Part A - Research and Investigation In General (Section 301)		
International Cooperation (Section 308)		
	Indefinite	$3,319,000

PUBLIC HEALTH SERVICE ACT

Title II--Administration

Public Health Service

"Section 207.(g) In accordance with regulations, individual scientists, other than commissioned officers of the Service, may be designated by the Surgeon General to receive fellowships, appointed for duty with the Service without regard to the civil service laws and compensated without regard to the Classification Act of 1923, as amended, may hold their fellowships under conditions prescribed therein, and may be assigned for studies or investigations either in this country or abroad during the terms of their fellowships."

Title III -- General Powers and Duties of Public Health Service

PART A -- RESEARCH AND INVESTIGATION

In General

"Section 301. The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification, sewage treatment, and pollution of lakes and streams. In carrying out the foregoing the Surgeon General is authorized to--........

(c) Establish and maintain research fellowships in the Service with such stipends and allowances, including traveling and subsistence expenses, as he may deem necessary to procure the assistance of the most brilliant and promising research fellows from the United States and abroad;

(d) Make grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals for such research or research training projects as are recommended by the National Advisory Health Council......"

International Cooperation

"Section 308. (b) In carrying out his responsibilities under this section the Surgeon General may --

(1) establish and maintain fellowships in the United States and in participating foreign countries;

(2) make grants to public institutions or agencies and to non-profit private institutions or agencies in the United States and in participating foreign countries for the purpose of establishing and maintaining fellowships;

(5) facilitates the interchange between the United States and participating foreign countries, and among participating foreign countries, of research scientists and experts who are engaged in experiments and programs of research or research training, and in carrying out such purpose may pay per diem compensation, subsistence, and travel for such scientists and experts when away from their places of residence at rates not to exceed those provided in section 5 of the Administrative Expenses Act of 1946 (5 U. S. C. 73b-2) for persons in the Government service employed intermittently."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer from:		
National Institute of Arthritis and Metabolic Diseases	$54,000	Proposed transfer for increased pay costs.
National Institute of Neurological Diseases and Stroke	30,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
Office of the Director	- 6,000	Transfer of the research contracting functions from NIH Management fund to Office of the Director for establishing the Office of Contracts and Grants.
Comparative transfer from:		
National Cancer Institute	22,000	To provide an equitable distribution of the Management Fund in 1972.

John E. Fogarty International Center
for Advanced Study in the Health Sciences

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1968	$500,000	$500,000	$725,000	$500,000
1969	600,000	600,000	600,000	600,000
1970	3,460,000	2,954,000	2,954,000	2,954,000
1971	2,664,000	3,582,000	3,582,000	3,582,000
1972	3,319,000			

Justification

John E. Fogarty International Center for
Advanced Study in the Health Sciences

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits........	49	$842,000	49	$886,000	---	+ $44,000
Other expenses.........	---	2,840,000	---	2,433,000	---	- 407,000
Total..............	49	3,682,000	49	3,319,000	---	- 363,000

General Statement

The John E. Fogarty International Center for Advanced Study in the Health Sciences is designed to facilitate and expand the continuing effort of the National Institutes of Health and the United States Government to broaden the knowledge base of the biomedical sciences. The Center serves as the focal point for the international activities of the National Institutes of Health and is responsible for the administration of the International Postdoctoral Fellowships Program, The Fogarty Scholars-in-Residence Program, The Conference and Seminars Program, International Visitors Center and the Special Foreign Currency Program (PL 480).

In administering these activities, the Fogarty International Center places its efforts on 1) facilitating the useful exchange of distinguished scientists and scholars as well as promising young scientists; 2) providing an environment, including facilities, which will contribute to the exchange, expansion and evolution of ideas; and 3) promoting international cooperation for the dissemination and sharing of biomedical knowledge both on a bilateral and multilateral basis to supplement and assist that exchange of knowledge by individual scientists and institutions.

The Fogarty International Center is requesting $3,319,000 in 1972, a net decrease of $363,000 below the 1971 estimate of $3,682,000.

Research Grants

Special Programs	1971 Estimate	1972 Estimate	Increase or Decrease
Gorgas Memorial Laboratory	$500,000	$500,000	---
Scientific Evaluation	20,000	20,000	---
Total research grants	$520,000	$520,000	---

Introduction

The Gorgas Memorial Laboratory explores the fundamental biomedical ecology of Panama and the Central American Republics and translates basic research to applicable public health measures. Situated in a tropical environment 2-1/2 hours flying time from the United States, this Laboratory offers exceptional opportunites for research and clinical training in the diseases and problems of the hot, wet tropical environments. Some diseases which are being researched include Chagas' disease, leishmaniasis, malaria, viral infections, intestinal parasites, and infantile diarrhea, all of which constitute a continuing threat to the tropical areas of the world.

Program plans 1971 and 1972

The support of the Gorgas Memorial Laboratory will be funded through the Fogarty International Center. It is anticipated that research on the above mentioned diseases will continue. Scientific and technical support will be provided in the following disciplines: virology, parasitology, malariology, serology, bacteriology, pathology, hematology, and medical entomology. The anticipated advances from this laboratory will assist in diagnosis, treatment, and management of tropical diseases which are rampart in hot climates.

The scientific evaluation grant provides for committee evaluation of the International Postdoctoral Fellowship Program by distinguished U. S. scientists.

Distribution of Research Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
1. Gorgas Memorial Laboratory..........	--	$500,000	--	$500,000	--	---
2. Scientific Evaluation..........	--	20,000	--	20,000	--	---
Total, research grants..........	--	520,000	--	520,000	--	---

Fellowships

	1971 Estimate	1972 Estimate	Increase or Decrease
International Postdoctoral Fellowships..............	$1,077,000	$739,000	-$338,000

Introduction

The International Postdoctoral Fellowships Program offers a unique opportunity for the sharing of scientific information on an international basis by permitting foreign investigators to work for a period of a year or two in collaboration with, and in the laboratories of, American colleagues in the United States. This program provides U. S. scientists access to the ideas of vigorous young investigators with stimulating and different viewpoints. In addition, since Fellows return to do independent research in their home countries, a basis is provided for the future collaboration between investigators here and those in different environmental settings.

Program Plans in 1971 and 1972

This program will be continued in 43 countries during 1972. Each country, through a nominating committee composed of prominent scientists of that country, submits its recommendations for fellowships. These nominations are competitively reviewed by the International Fellowship Review Committee at the NIH.

Funds requested in the revised estimate for 1972 will provide for 79 awards compared to 122 in 1971, a decrease of 43. This decrease reflects the priorities in the 1972 President's Budget related to national health programs.

Distribution of Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Continuations						
Noncompeting.....	54	$397,000	35	$299,000	-19	-$98,000
New awards..........	68	680,000	44	440,000	-24	-240,000
Total fellowships.	122	1,077,000	79	739,000	-43	-338,000

Fellowships (By type of Program)

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
International Postdoctoral...........	122	$1,077,000	79	$739,000	-43	-$338,000

Fellowship Program Analysis

	1970 Actual	1971 Estimate	1972 Estimate	Increase or Decrease
International Postdoctoral..	$1,026,595	$1,077,000	$739,000	-$338,000

Fogarty Scholarships

	1971 Estimate	1972 Estimate	Increase or Decrease
Fogarty Scholarships.......	$170,000	$170,000	---

Introduction

The objective of this program is the exploration of current problems confronting society as a result of modern biomedical research, the delineation of problems to come and the synthesis of new approaches for the solution of these problems. The program will also promote fruitful exchange of ideas between distinguished leaders in science, scholars in other disciplines and other creative individuals.

The program selects outstanding scientists and other scholars who focus their attention on broad aspects of important issues raised by the findings of modern biomedical research. While in residence at the Center the scholars are encouraged by group interaction to attack broad problems, the solutions to which require an interdisciplinary approach or whose solution lies beyond the knowledge of a single individual. The program draws the scholars from the international biomedical community, and from among those people who possess special qualifications in science administration, those whose scholarly attainments suggest that they can contribute to the interactions of the group. The scope of this program includes a continuing series of comparative studies and assessments of the trends of international science policy and the organizational structure and management of research and development on an international scale.

The unique environment at the NIH offers an unusual opportunity for scholars to interact with large numbers of intramural staff scientists in discussion--focusing attention on important health problems, holding small conferences, workshops and, on a group basis, assessing the state-of-the-art in many disease areas. It is expected that scholars will provide inspiration to others and delineate important areas of research.

Program Plans in 1971 and 1972

Funds requested for 1972 will provide for 6 awards, the same as in 1971.

International Center

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	49	$842,000	49	$886,000	---	+$44,000
Other expenses........	---	1,073,000	---	1,004,000	---	- 69,000
Total.............	49	1,915,000	49	1,890,000	---	- 25,000

The John E. Fogarty International Center for Advanced Study in the Health Sciences has made rapid improvement in its advanced study program where emphasis has been placed upon the Conference and Seminars Program and the Fogarty Scholars-in-Residence Program. Other elements of international cooperation and advanced study include an organized program of bilateral cooperation and a redesigned effort to obtain scientific information by utilizing the competences and specialists of the various NIH Institutes.

Through its Conference and Seminars Program, The Fogarty International Center provides a forum for the review and discussion of major biomedical issues confronting the nation. In addition to basic themes developed by the Center, emphasis is placed upon cooperation by and with the various Institutes of the NIH, as well as other federal and international organizations.

Program Plans for 1971 and 1972

Conference and Seminar Program

Objectives of the Conference and Seminar Program are:

To promote advanced study in the health sciences by conducting international conferences, seminars, workshops and training courses within the scope of the NIH mission, i.e., advancement of knowledge for the nation's health.

To identify the legal, ethical, social and economic problems that may arise from new findings of biomedical research.

To advance our understanding and insight into these problems confronting us by holding cross-disciplinary conferences and seminars.

To stimulate research in particular fields by holding training seminars, workshops and courses, drawing on the international and biomedical research community for participants and faculty.

During 1972 the following conferences will be held at the Center:

Workshop on Histocompatability Antigens in Man.

Reform of Medical Education III. The Impact of New Health Systems on Medical Education.

Ethical Problems in Genetic Counseling.

Taxonomy of Malaria Parasites II.

Workshop on Epidemiology of Cancer.

Epidemiological Approaches to Mutagenesis and Carcinogenesis.

Follow-up action based on the conclusions of these conferences and seminars will be sought through NIH Institutes, through collaborative arrangements with other countries, with one of the international agencies with health science programs such as the WHO, or with other U. S. government agencies.

The Fogarty International Center provides the opportunity for scholarly considerations, for informal and unstructured exchange and a facility which will permit and foster daily communication among the professional staff of NIH and distinguished scientific visitors.

Scientific Activities (PL 480 Program)

The Fogarty International Center has the coordinating and policy formulation function and operating responsibility for the NIH Special Foreign Currency Program supported with an allotment of funds from the appropriation "Scientific Activities Overseas" managed by the Office of the International Health, Office of the Secretary, DHEW.

International Visitors Center

The International Visitors Center provides a dignified setting for the reception of visiting American and Foreign scientists; affords an opportunity to visitors for discussion of international biomedical problems with professional staff; and for the establishment of appropriate contacts between such visitors and the Fogarty International Center and NIH staff members.

The request this year for the International Center is $1,890,000, a net decrease of $25,000 from 1971.

Program Purpose and Accomplishments

Activity: Research grants (Public Health Service Act Title III Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$520,000	Indefinite	---	$520,000

Purpose: The major portion of this research grant appropriation is to support the work performed by the Gorgas Memorial Laboratory. In addition funds are provided to evaluate International Postdoctoral Fellowship applications.

Explanation: The amount of $500,000 provides a major portion of the resources to fund the programs of the Gorgas Memorial Institute in Panama. The Institute is investigating diseases which are prevelant in tropical areas and to which U. S. citizens in these areas are subject.

Accomplishments in 1971: A $500,000 grant was awarded to support the Gorgas Memorial Institute and the remainder of the funds were awarded to a scientific evaluation committee.

Objectives for 1972: The continuation of these grants for 1972 will be furnished from this appropriation.

Activity: Fellowships (Public Health Service Act Title III Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$1,077,000	Indefinite	---	$739,000

Purpose: The International Postdoctoral Fellowships Program offers a unique opportunity for the sharing of scientific information on an international basis by permitting foreign investigators to work for a period of a year or two in collaboration with, and in the laboratories of, American colleagues in the United States. This program provides U. S. Scientists access to the ideas of vigorous young investigators with stimulating and different viewpoints.

Explanation: The International Postdoctoral Fellowship Program supports Fellows from 43 countries. Each country, through a nominating committee composed of prominent scientists of that country, submits its recommendations for fellowships. These nominations are competitively reviewed by the International Fellowship Review Committee at the NIH.

Accomplishments in 1971: In 1971, 122 International Postdoctoral Fellowships were awarded.

Objectives for 1972: Seventy-nine International Postdoctoral Fellowships will be awarded.

Activity: Fogarty Scholarships (Public Health Service Act Title III Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$170,000	Indefinite	---	$170,000

Purpose: The Fogarty Scholars-in-Residence program, which was initiated in 1969 selects outstanding scientists and other scholars who focus their attention on broad aspects of important issues raised by the findings of modern biomedical research. While in residence at the Center the scholars are encouraged by group interaction to attack broad problems, the solutions to which require an interdisciplinary approach or whose solution lies beyond the knowledge of a single individual.

Explanation: Fogarty Scholars-in-Residence through the unique environment at NIH have an unusual opportunity to interact with large numbers of intramural staff scientists in discussions--focusing attention on important health problems, holding small conferences, workshops, and, on a group basis assessing the state-of-the-art in many disease areas.

Accomplishments in 1971: In 1971, six Fogarty Scholarships were awarded.

Objectives for 1972: Six Fogarty Scholarships will be awarded.

Activity: International Center (Public Health Service Act Title III Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
49	$1,915,000	Indefinite	49	$1,890,000

Purpose: The John E. Fogarty International Center for Advanced Study in the Health Sciences is designed to facilitate and expand the continuing effort of the National Institutes of Health and the United States Government to broaden the knowledge base of the biomedical sciences. The Center serves as the focal point for the international activities of the National Institutes of Health. The Center also is responsible for the administration of the International Postdoctoral Fellowships Program, the Scholars-in-Residence Program, the Conference and Seminars Program, the International Visitors Center and the Scientific Activities Program (PL 480).

Explanation: In administering these activities, the Fogarty International Center will focus its efforts on (1) facilitating the useful exchange of distinguished scientists and scholars including promising young scientists; (2) providing an environment, including facilities, which will contribute to the exchange, expansion and evolution of ideas; and (3) promoting international cooperation for the dissemination and sharing of biomedical knowledge both on a bilateral and multilateral basis to supplement and assist that exchange of knowledge by individual scientists and institutions.

Accomplishments in 1971: In addition to operating the grants and fellowships programs mentiond, the International Conference Program held nine conferences and seminars during fiscal year 1971. Administered and operated other programs mentioned above.

Objectives for 1972: We will continue to coordinate, administer and operate these International Programs of the National Institutes of Health.

Fogarty International Center

STATEMENT OF DR. MILO C. LEAVITT, DIRECTOR ACCOMPANIED BY GEORGE PRESSON

ADVANCED STUDY

Senator MAGNUSON. All right, Dr. Leavitt.

Dr. LEAVITT. Mr. Chairman, I am pleased to present a brief summary statement on the programs of the Fogarty International Center, which is the focal point at NIH for international activity. It is also the base for our advanced study program.

The advanced study programs of the Fogarty International Center provide a new dimension and complement; the research efforts of the NIH institutes and divisions by serving as an important channel for the communication of research knowledge. Its conferences and seminars provide opportunities for continued discussion and the exchange of ideas on a series of questions on national and international biomedical problems.

To date, nearly 30 meetings have been conducted by this program in such fields as medical education, genetics and family planning. Meetings concerning these and other themes are now being planned through 1973.

SCHOLARS-IN-RESIDENCE

Another aspect of advanced study is the scholars-in-residence program which invites outstanding scholars to live and work at NIH, interacting with other invited scholars and NIH scientists on current medical problems. Here we provide an opportunity for these outstanding individuals to devote their entire effort to the exploration of broad and important issues in science, the acquisition of new knowledge and the study of the application and consequences of scientific advances upon modern society. It is through this program that we can capture the ideas, explore the failures and the progress of the past for consideration of the future.

PREVENTIVE MEDICINE STUDIES

The most unusual aspect of the advanced study program of the Fogarty International Center is the opportunity to examine major problems through a multidisciplinary approach. For example, authorities representing all levels of the health care delivery system are manifesting an increasing interest in preventive medicine. Yet there is widespread disagreement about how much of an impact more active programs of prevention would make. The vast majority of disabling chronic diseases, degenerative inflammatory and neoplastic, are largely unpreventable, but clues to profitable leads do exist. In the case of chronic diseases, secondary preventive measures afford opportunities that may be missed due to technical or financial shortcomings.

The state of the art of preventive medicine needs to be delineated in an indepth survey by epidemiologists, biostatisticians. clinical investigators, basic scientists, sociologists, and economists. The Fogarty Internatonal Center has initiated such a study.

CHINA HEALTH STUDIES PROJECT

The most timely subject on which we have also started study is that of the various aspects of medicine practiced in the People's Republic of China. These studies will include an examination of traditional medicine versus western medicine and involve biomedical research, medical education and training, health manpower, and provision of medical services in the urban and rural parts of that country.

Senator MAGNUSON. And nutrition?

Dr. LEAVITT. Yes, sir.

Senator MAGNUSON. How do they feed 750 million people? We might learn something from them.

Dr. LEAVITT. These are some of the things we hope to learn more about.

We do want to advance American knowledge of medicine as it is practiced within the People's Republic of China. We also wish to encourage the publication of information involving medicine in that country. One of the most difficult problems in developing a China health study project is the lack of current information on the state of medicine on the mainland today. To develop an overall view of the available published information on the subject, the Fogarty Center has initiated efforts to compile a detailed bibliography for the use of scholars interested in China medicine. Using this material, the center will engage in a series of informal studies, the experience from which will enable us to provide additional scientific information to the biomedical community.

BUDGET REQUEST

For these and other program activities, the Fogarty International Center is requesting a total of $3,319,000 for 1972, a net decrease of $363,000 below the 1971 level of $3,682,000.

Senator MAGNUSON. Maybe Dr. Marston and I will go there ahead of Nixon. We will find out for you.

Dr. MARSTON. All right, sir.

Senator MAGNUSON. They are letting some people in to look. I always thought we could learn a lot from them, considering their production level. I know about famines in China, I lived there for a year. Actually, they do a stretching job that is unbelievable in nutrition, in feeding their people. We can learn a lot from how they do it.

INTERNATIONAL MEETINGS

You said you had five meetings?

Dr. LEAVITT. We have had a total of 30 meetings.

Senator MAGNUSON. How frequently do they occur?

Dr. LEAVITT. It varies.

Senator MAGNUSON. You have no set dates?

Dr. LEAVITT. It depends on the size. We may have workshops in collaboration with the Institutes and Divisions at NIH. These may be once every 2 weeks. Larger meetings may occur three or four times a year.

Senator MAGNUSON. How do you invite people? How do they get there? Do you invite them or do they ask to come? Or is it a combination of both?

MEETING AT STOCKHOLM, SWEDEN

Dr. **LEAVITT**. Usually, we invite them. For example, we know that in 1972 there is going to be a conference on the environment in Stockholm

Senator **MAGNUSON**. Yes, I know that.

Dr. **LEAVITT**. NIH could not engage in an indepth study on every aspect of the environment. Therefore in collaboration with the National Institute of Environmental Health Sciences we determined that we would take a small segment of the problem, for example, metallic contaminants, and examine that very carefully rather than do superficial studies on a variety of environmental problems. We have in collaboration with that institute held a series of workshops involving authorities whom the Fogarty Center and the National Institute of Environmental Health Sciences invited. We are in the unique position at the Center of having all the expertise at NIH at our disposal whenever we need scientific assistance.

WORLD HEALTH ENVIRONMENTAL INSTITUTE

Senator **MAGNUSON**. The Stockholm meeting, I don't know whether you recall it or not, but I passed a bill for a World Environmental Institute. We had a big group here about a month ago from different countries involved in it and the State Department, Christian Herter, Jr., is handling it down there. I expect to go, myself, if I can get away, because it is under the basis of the outline of the bill I passed. Of course it is right up your street because we are not talking about world enforcement; we are just talking about a bank of information or a place where information can be exchanged based upon the fact as we move along what pollutes the Yellow River is important to the whole planet, or vice versa. This is the sort of broad thing we are going into.

Of course the United Nations will be some kind of framework for it through the environmental subcommittee they have. But we will lay some foundation. As far as we know pretty nearly every nation wants to come and send their people. I am glad you mentioned that. The people involved are quite excited about it, that we could start this some place. And based a little bit on what we did with the International Geophysical Year, which was a great success.

Dr. **MARSTON**. Sometimes in discussions of large meetings on the environment the health aspects do not always get all of the interest that they deserve.

Senator **MAGNUSON**. So you are going to zero in on one phase of it.

Dr. **LEAVITT**. Yes, sir.

Dr. **MARSTON**. I know you will continue to have an interest in that phase, too.

Senator **MAGNUSON**. Yes, I will back them up. I will be the backstop.

FOGARTY INTERNATIONAL CENTER BUILDING

Now, the House fellows are going to ask what is the status of the center, itself, the plans for a building or addition.

Dr. LEAVITT. The building plans are almost complete, in fact they were due in GSA just this week for final review. It may be ready to go out on bid early this autumn.

FELLOWSHIPS

Senator MAGNUSON. When you talk about fellowships in your Center, just what do you mean? To whom do you give fellowships?

INTERNATIONAL POST-DOCTORAL FELLOWSHIPS

Dr. LEAVITT. The largest program is that of the international post-doctoral fellowships. In this program we bring promising young scientists from abroad to work in U.S. laboratories in our universities and at NIH. They remain in the United States for a year of research training and then must, according to our rules, return to their country of origin. Last year we awarded a total of 122 such scholarships.

Senator MAGNUSON. In different fields?

SCHOLARSHIP-IN-RESIDENCE PROGRAM

Dr. LEAVITT. Yes, sir; in the whole variety of biomedical disciplines. The other fellowship program is the Scholarship-in-Residence program, which at its present level of $170,00 a year permits us to fund six scholarships. These are world authorities and they are selected by the International Advisory Committee.

FELLOWSHIP EXCHANGES

Senator MAGNUSON. Is there any exchange of fellowships contemplated?

Dr. LEAVITT. This is an activity to which I have given very serious consideration for the future.

Senator MAGNUSON. I know you don't do it now.

Dr. MARSTON. There is the one example really patterned after this program. Sweden, a number of years ago, established two fellowships. I have some knowldege of the post-doctoral fellowships program since I chaired that committee for 5 years. There is no question but that this has allowed the United States at very low cost to participate with about 40 of the countries in the world. They nominate their best scientists—the best minds, and then we make the final selection in this country. These young men come over and work on problems of interest to the health of the American people. This has been done for a very modest cost. We have been able to get the best minds in the world to come here and, at the same time, have those individuals become interested in our health problems.

It has been a benefit to them, too, because they have been able to go back to their countries better trained than they were.

Senator MAGNUSON. By exchange, I meant do any of ours go to another country?

Dr. MARSTON. Sweden is the only country which has set up a similar program under which they have arranged for Americans to receive training and experience.

Senator MAGNUSON. I think ultimately, you have to get into that as you move along. That is a street that works both ways in the field of health and medicine.

Dr. MARSTON. Yes, sir.

Senator MAGNUSON. Do you have any questions on the Fogarty International Center?

Senator COTTON. No questions.

I am sorry I missed your original statement.

I commend you.

Senator MAGNUSON. Thank you very much, gentlemen.

Dr. LEAVITT. Thank you, Mr. Chairman.

NATIONAL INSTITUTES OF HEALTH

NATIONAL LIBRARY OF MEDICINE

Justifications

Appropriation Estimate

NATIONAL LIBRARY OF MEDICINE

To carry out, to the extent not otherwise provided for, section 301 with respect to health information communications and part I and J of title III of the Public Health Service Act, [$20,769,000] *$21,981,000* of which [$1,842,000] *$2,002,000* shall remain available until June 30, [1972] *1973*.

Amounts Available for Obligation

	1971	1972
Appropriation..................................	$20,769,000	$21,981,000
Real transfers to:		
"Departmental Management"................	-4,000	---
Real transfers from:		
"National Institute of Environmental Health Sciences" (Proposed transfer for increased pay costs)....................	442,000	---
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs)....................	229,000	---
Comparative transfers to:		
"Office of the Director"..................	-38,000	---
Comparative transfer from:		
"National Institute of Dental Research"...	112,000	---
Total obligations..........................	$21,510,000	$21,981,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Medical Library Assistance:						
101	Training	---	1,000,000	---	1,000,000	---	---
102	Special Scientific Projects	---	5,000	---	95,000	---	+90,000
102	Research	---	590,000	---	600,000	---	+10,000
103	Library Resources	---	2,205,000	---	2,105,000	---	-100,000
104	Regional Medical Libraries	---	1,912,000	---	2,002,000	---	+90,000
104	Publications Support	---	280,000	---	290,000	---	+10,000
	Subtotal	---	5,992,000	---	6,092,000	---	+100,000
	Direct Operations:						
105	Lister Hill National Center for Biomedical Communications	10	1,370,000	17	1,398,000	+7	+28,000
106	National Medical Audiovisual Center	105	2,023,000	105	2,127,000	---	+104,000
107	Library Operations	274	8,016,000	247	8,125,000	---	+109,000
109	Toxicology Information	18	1,237,000	18	1,237,000	---	---
110	Review and Approval of Grants	32	665,000	32	704,000	---	+39,000
110	Program Direction	55	2,207,000	55	2,298,000	---	+91,000
	Subtotal	467	15,518,000	474	15,889,000	+7	+371,000
	Total obligations	467	21,510,000	474	21,981,000	+7	+471,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions......	467	474	+7
Full-time equivalent of all other positions............................	18	18	---
Average number of all employees..........	485	489	+4
Personnel Compensation:			
Permanent positions....................	$6,135,000	$6,679,000	+544,000
Positions other than permanent.........	203,000	203,000	---
Other personnel compensation...........	89,000	89,000	---
Subtotal, personnel compensation.....	6,427,000	6,971,000	+544,000
Personnel benefits.......................	515,000	577,000	+62,000
Travel and transportation of persons.....	167,000	167,000	---
Transportation of things.................	33,000	33,000	---
Rent, communications, and utilities......	1,704,000	1,704,000	---
Printing and reproduction................	468,000	468,000	---
Other services:			
Project contracts......................	3,572,000	3,447,000	-125,000
Payment to NIH Management Fund.........	981,000	1,046,000	+65,000
Other..................................	818,000	868,000	+50,000
Supplies and materials...................	370,000	245,000	-125,000
Equipment................................	463,000	363,000	-100,000
Grants, subsidies and contributions......	5,992,000	6,092,000	+100,000
Total obligations by object...........	21,510,000	21,981,000	+471,000

Summary of Changes

1971 estimated obligations	$21,510,000
1972 estimated obligations	21,981,000
Net change	+471,000

	Base		Change from Base	
Increases:	Pos.	Amount	Pos.	Amount
A. Built-in				
1. Annualization of 1971 pay increase cost	---	---	---	+232,000
2. Within grade pay increase	---	---	---	+145,000
3. Extra days pay FY 1972	---	---	---	+24,000
4. FTS rate increase	---	---	---	+5,000
Subtotal	---	---	---	+406,000
B. Program				
1. Special scientific projects	---	5,000	---	+90,000
2. Research	---	590,000	---	+10,000
3. Regional medical libraries	---	1,912,000	---	+90,000
4. Publications support	---	280,000	---	+10,000
Subtotal	---	---	---	+200,000
C. Payment to "National Institutes of Health Management Fund" for centrally furnished services	---	981,000	---	+65,000
Total increases	---	---	---	+671,000
Decreases:				
A. Program				
1. Library resources	---	---	---	-100,000
2. Library operations	---	---	---	-100,000
Total decreases	---	---	---	-200,000
Total, net change	---	---	---	+471,000

Explanation of Changes

Built-in Increases -- These increases will provide: $232,000 for the annualization of the 1971 pay increase cost authorized under Executive Order 11576; $145,000 for within grade pay increases in 1972; $24,000 for extra days pay in 1972 and $5,000 for increased cost in 1972 of using the Federal Telecommunications System.

Special scientific projects grants -- An increase of $90,000 will bring the total for this program to $95,000. This increase will permit the funding of three new projects.

Research grants -- An increase of $10,000 will bring the total for this program to $600,000. This will permit the continuance of this program at the 1971 level.

Regional medical libraries grants -- An increase of $90,000 will bring the total for this program to $2,002,000. The 1972 amount will fund continuation of the ten existing regional medical libraries and provide some increases in services to meet rising user demand.

Publication support grants -- An increase of $10,000 will bring the total for this program to $290,000. This increase will permit the funding of this program at the 1971 level.

Library resource grants -- A decrease of $100,000 will bring the totals for this program to $2,105,000. This will reduce by 135 the number of grants to be supported in 1972.

Library operations -- A total of $8,125,000 and 247 positions is requested in 1972, a program decrease of $100,000. The decrease represents planned reductions in project contracts.

Authorizing Legislation

	1972	
	Authorization Requested	Appropriation Requested
Legislation		
Public Health Service Act		
Section 371 - Purpose and Establishment of Library	Indefinite	15,889,000
Section 394 - Grants for Training in Medical Library Sciences	1,750,000	1,000,000
Section 395a - Assistance for Special Scientific Projects	500,000	95,000
Section 395b - Research and Development in Medical Library Sciences and Related Fields	3,000,000	600,000
Section 396 - Grants for Improving and Expanding the Basic Resources of Medical Libraries and Related Instrumentalities	4,000,000	2,105,000
Section 397 - Grants for Establishment of Regional Medical Libraries	3,250,000	2,002,000
Section 398 - Financial Support for Biomedical Publications	1,000,000	290,000

Explanation of Transfers

	1971 Estimate	Purpose
Real transfers to:		
"Departmental Management"	- 4,000	To establish Facilities Engineering and Construction Agency.
Real transfers from:		
"National Institute of Environmental Health Sciences"	+442,000	Proposed transfer for increased pay costs.
"National Institute of General Medical Sciences"	+229,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
"Office of the Director"	- 38,000	Transfer of research contracts function from NIH Management Fund to Office of the Director.
Comparative transfer from:		
"National Institute of Dental Research"	+112,000	To provide an equitable distribution of the Management Fund in 1972.

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$ 2,066,000	$ 2,066,000	$ 2,066,000	$ 2,066,000
1963	3,335,000	3,335,000	3,335,000	3,335,000
1964	4,074,000	4,074,000	4,074,000	4,074,000
1965	3,678,000	3,858,000	4,058,000	3,958,000
1966	9,185,000	9,185,000	9,685,000	9,685,000
1967	19,231,000	20,092,000	20,192,000	20,192,000
1968	21,162,000	18,662,000	21,162,000	20,192,000
1969	19,172,000	17,149,000	19,172,000	18,160,500
1970	22,882,000	19,682,000	19,682,000	19,682,000
1971	19,769,000	19,769,000	22,233,000	20,769,000
1972	21,981,000			

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	467	6,942,000	474	7,548,000	+7	+606,000
Other expenses...........	--	14,568,000	--	14,433,000	--	-135,000
Total................	467	21,510,000	474	21,981,000	+7	+471,000

General Statement

The National Library of Medicine is engaged in programs to advance the medical and health-related sciences through facilitating the exchange of information. The Library collects, organizes, and disseminates biomedical information to practitioners, educators, and research investigators, and carries out programs designed to strengthen existing and develop new medical library services throughout the United States.

Through the support programs authorized by the Medical Library Assistance Act of 1965 and its extension act of 1970, the National Library of Medicine has helped biomedical libraries and related institutions to support health care, develop more effective relationships with central resource libraries, improve techniques of information handling, and enhance the role of libraries as learning resources.

Other achievements include the production of new bibliographic publications from the computer-based Medical Literature Analysis and Retrieval System (MEDLARS) and the further development of an improved second-generation system, MEDLARS II. Through MEDLARS, the Library has extended its resources to libraries and individuals throughout the United States and abroad. It has also provided direct reference and interlibrary loan services to thousands of users.

The NLM has responsibility for establishing through its Toxicology Information Program a nationwide system for providing data on the harmful effects of chemical compounds. The program has developed a directory of toxicological information sources; compiled a toxicity bibliography and a register of chemical compounds; and initiated development of software necessary for a computerized information storage and retrieval system.

The Library's Lister Hill National Center for Biomedical Communications has been designated the focal point of the Department for coordinating biomedical communications systems and network projects and is responsible for applying computer and communications technology to the improvement of health care, medical education, and biomedical research. The Center has been pursuing its goals through inexpensive, precedent-setting experiments such as an on-line computer bibliographic search service of 100 clinical journals which can be accessed for the price of a telephone call. In 1972 the Center will continue to explore satellite communications as a means of linking physicians in remote areas to the resources of large medical centers, and its successful demonstration of the use of on-line bibliographic services (AIM-TWX) will be expanded on a national basis.

The 1972 budget request provides the minimum level of funds necessary to maintain the Library's programs at their current level of activity.

GRANTS

The programs authorized by the Medical Library Assistance Act of 1965 (Public Law 89-291) and the Medical Library Assistance Extension Act of 1970 (Public Law 91-212) are designed to meet national needs for better health information services through improved health library resources and facilities, trained manpower, and improved health communications technology. Specifically, the Act authorizes support of projects to develop resources and techniques necessary to collect, preserve, store, process, retrieve, and facilitate the dissemination and use of health science information.

Training and Fellowships

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Non-competing continuation grants..........	7	$700,000	7	$810,000	--	+$110,000
New grants..............	5	300,000	4	190,000	-1	- 110,000
Total..............	12	1,000,000	11	1,000,000	-1	--

The 1972 request for training is the same as the 1971. This will support seven non-competing continuation grants and four new grants for training programs in medical librarianship and related biomedical communications specialties. Current estimates indicate that each of 100 medical schools requires an average of 10 professionally trained specialists in this field, and approximately 1,000 other health related professional schools each requires at least one librarian. In addition, many of the 7,200 accredited hospitals need hospital librarians or other medical information specialists. New and growing professional schools, new and developing mechanisms for health care and growing awareness of the importance of maintaining professional skills through continuing education and training will require an increasing number of specialists to provide information services. The growing demand for such services requires development and support for a variety of new training opportunities. In 1970, the National Library of Medicine supported 90 trainees; in 1971, 100 trainees.

Quite clearly the training of 100 librarians and biomedical communications specialists per year will not satisfy the needs in this field for many years. Accordingly, steps are being taken to increase the number of graduates in these programs, particularly medical librarians, without sacrificing quality. In view of the fact that schools of librarian science graduate thousands of individuals with a masters degree, we are experimenting with methods of converting these graduates to medical librarians in a shorter and less expensive procedure than is involved when a college graduate must be supported by these grants from the baccalaureate degree to the masters degree in medical librarianship. In addition, we believe that the recipients of this new, innovative type of training will be qualified to assume positions of major responsibility and will, in turn, be able to train additional medical librarians.

Special Scientific Projects

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Non-competing continuation grants..........	1	$5,000	--	--	-1	-$5,000
New grants..............	--	--	3	$95,000	+3	95,000
Total...............	1	5,000	3	95,000	+2	90,000

The 1972 request of $95,000 for Special Scientific Projects represents an increase of $90,000 over the 1971 level of support.

The purpose and intent of the Special Scientific Project Awards program is to support outstanding scholars who can devote their full time to analysis, evaluation and documentation of major progress in the health sciences. These studies result in the publication of important monographs on advances in science. In this way the massive scientific literature is reduced to a readily accessible and usable form.

The additional $90,000 will permit the National Library of Medicine to support three projects by distinguished senior scientists and physicians to write works on major subjects of broad health interest.

Research

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Budget Authority:						
Non-competing continuation grants........	11	$380,000	14	$525,000	+3	+$145,000
New grants............	9	210,000	3	75,000	-6	- 135,000
Total.............	20	590,000	17	600,000	-3	10,000

The 1972 request is for $600,000 in new obligational authority. It represents an increase of $10,000 from the 1971 level of $590,000. This amount will support 14 non-competing continuation grants and 3 new projects.

These funds will be utilized for research and demonstration grants to encourage and support the rapidly growing field of biomedical communications research. More scientists are being trained and entering this field, but they can advance the state of the art only if funds to support their research are available. For the health field these funds come almost exclusively from the National Library of Medicine. Many of the national problems of biomedical information services can only be resolved by sophisticated research in this field. This research grant program has supported one project to develop and test an on-line computer-base serials control system for a medical school library; another project compares manual and automated systems for indexing the medical literature for computer-based storage and retrieval of bibliographic citations; a third project will gather and analyze data to characterize the information exchange preferences and needs of several groups of health teachers and researchers.

The continuing high level of the national effort in health service, education, and research produces and requires a constantly growing amount of biomedical information. Knowledge leading to more effective transmission, storage, and retrieval of this information at realistic cost-benefit ratios is an important goal of biomedical information research. Projects will be supported in: (1) information seeking practices of health professionals; (2) improvement of the biomedical vocabulary for written and mechanized information handling; (3) improved information systems; and (4) development and testing of various information media. Demonstration projects are needed to show how the findings of this research can improve information services to health professionals.

Library Resources

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Non-competing continuation grants..........	394	$1,500,000	165	$ 830,000	-229	-$670,000
New grants.............	147	705,000	241	1,275,000	+ 94	+ 570,000
Total..............	541	2,205,000	406	2,105,000	-135	- 100,000

The 1972 request of $2,105,000 for library resources grants represents a decrease of $100,000 in the level of support from 1971. This sum will permit the Library to support the 165 non-competing continuation grants in hospitals and health professional educational institutions, and to make 241 new awards.

Medical Library Resource Grants are designed to assist in the establishment, improvement, and expansion of the Nation's health science libraries, and to encourage increased community support for the local library. Grants for a one-year period are made to health institutions which demonstrate a need to establish basic collections and services. Grants are also made to institutions with existing health science libraries for the support of projects designed to make the evergrowing and already overwhelming scientific literature more rapidly accessible to health professionals throughout the United States. Funded applications include cooperative programs in which a strong resource library undertakes to provide training, consultation and loan services for the small community hospitals, clinics and other health facilities; projects which seek to speed the delivery of services through the use of modern communication devices and automation techniques; and projects which simply increase the information resources of an institution after an assessment of needs of the health professionals.

This program is also important in complementing the expanding service activities of the Regional Medical Library Program. The full benefits of the Regional Medical Library networks can be realized more effectively if local library resources are selectively improved.

Regional Medical Libraries

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Budget Authority:						
Non-competing continuation grants.....	10	$1,912,000	10	$2,002,000	--	+$90,000
New grants..........	--	--	--	--	--	--
Total............	10	1,912,000	10	2,002,000	--	+ 90,000

The 1972 request for $2,002,000 represents an increase of $90,000 over the 1971 level. This amount will allow the Library to maintain the support of the 10 active regional libraries and will cover the increased costs of operation for improved service to meet rising service demands. The objective of this program is to develop a system of Regional Medical Libraries with the necessary depth and scope to supplement the services of other medical libraries in their designated region. Back-up library services in the form of inter-library loans, MEDLARS literature searches and other reference services are now available across the Nation.

In 1970, complete geographic coverage was achieved with the establishment of the Mid-Continental Regional Library located in Omaha, Nebraska and the South Central Regional Library located at Dallas, Texas. In 1972 approximately 70 percent of the appropriation will be used to expand and improve the Regional Medical Libraries. The remainder of the funds will be granted to regional libraries to support programs designed to improve the methods of providing information to all qualified users. Ready access to the literature by physicians is vital to the health of the citizens of the United States, and its availability to educators assists in the development of health manpower.

Publications Support

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No. of Awards	Amount	No. of Awards	Amount	No. of Awards	Amount
Non-competing continuation grants.........	5	$ 41,000	7	$ 161,000	+2	+$120,000
New grants.............	12	239,000	7	129,000	-5	-110,000
Total..............	17	280,000	14	290,000	-3	+ 10,000

The 1972 request of $290,000 for publication support grants will allow the Library to support seven continuing projects and seven new projects.

The purpose of this program is to assist in the publication of works vital to improving the health of all the people of this country. Support is provided for preparation and publication of abstracts, bibliographies, handbooks, critical reviews, monographs and translations for health scientists, educators, and practitioners. Publications supported by the program are those of need and merit which cannot be financed by commercial publishers. Among the funded projects are reviews of recent research on environmental health and substances toxic to man; assistance for a new periodical to provide needed information on nutrition education to workers in this field; the development of a manual of community medicine for use by physicians in remote or relatively underdeveloped regions; and experimental or innovative publications to improve and promote self-instruction by medical students.

Current trends indicate increased need for the publications supported under this program to meet the challenge of the increasing output of new knowledge of health and disease.

DIRECT OPERATIONS

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	467	$ 6,942,000	474	$ 7,548,000	+7	+$606,000
Other expenses..........	--	8,576,000	--	8,341,000	--	- 235,000
Total..............	467	15,518,000	474	15,889,000	+7	+ 371,000

Lister Hill National Center for Biomedical Communications

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	10	$ 210,000	17	$ 338,000	+7	+$128,000
Other expenses..........	--	1,160,000	--	1,060,000	--	- 100,000
Total..............	10	1,370,000	17	1,398,000	+7	+ 28,000

The Lister Hill National Center for Biomedical Communications is the focal point for coordinating the biomedical communications systems for the entire Department and is responsible for developing a Biomedical Communications Network. It is now providing an experimental service to over 30 hospitals and libraries using teletypewriter terminals to access bibliographic citations to current medical information stored in an on-line time-sharing computer. The capability thus being explored enables users to access the literature from the 100 leading English language medical care journals for the price of a telephone call. This experimental service has been very successful, cutting retrieval times from weeks to minutes at reduced costs for bibliographic service when compared with older computer systems. The development is now aimed at improving this system and making it one which can be operated on other computers in the United States and abroad. The Center has also explored such projects as support for self paced learning and education for medical students and practicing physicians with the use of new multi-media devices; satellite communications for exchange of medical information between the community hospital or academic medical center and remote health stations. In addition, the Center is making efforts to select and evaluate curriculum content for medical education and to develop systems for the sharing of such material among medical colleges.

The augmentation provided by the Congress in the 1971 budget is being used to expedite the experiment in satellite communications for Alaska to provide medical consultation and education to remote parts of the state.

Preliminary experiments have been run using the Application Technology Satellites of the National Aeronautics and Space Administration which demonstrated the feasibility of this approach for voice, pictures in color, computer information, and electrocardiograms. Further experiments are anticipated soon testing the satellite communications between health personnel in Alaska, and Stanford University, the University of Washington, and the University of Wisconsin. These experiments are designed to verify the capability of such satellites to meet dispersed communications needs where telephones are unavailable, and provide reliable communications where radio is unreliable because of the effects of the aurora borealis.

In addition, some of the funds are being used to speed the development of a two-way color television network linking the medical schools and hospitals in Vermont and New Hampshire. An experimental link in this network is now operating from Dartmouth to Claremont Hospital and has been successful in bringing the expertise of the medical center to that hospital, particularly in the intensive care of heart and cancer patients. The overall network will link 15 hospitals and 3 university medical centers in what is hoped will be a mutually reinforcing program of improved health care delivery and education.

The 1972 budget request represents a continuation of the program at its present level, with enough additional funds to cover within-grade pay increases. There is, however a proposed redistribution of resources between contract funds and in-house personnel. One hundred thousand dollars has been reallocated out of contract funds to provide seven additional personnel positions in the Center. The present personnel level of 10 (7 professional and 3 secretarial) has been found inadequate to manage the projects of the Center as they move toward operational capabilities. In particular, the increase in technical assistance provided by the Center to other elements of the government, medical schools, hospitals, and professional societies has created a requirement for additional staff. In essence, the Center is becoming the major technology transfer element between the computer and communications communities and the medical community. Continuation of this development cannot be accomplished solely through contracts, and therefore, requires additional personnel.

National Medical Audiovisual Center

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	105	$1,464,000	105	$1,568,000	--	+$104,000
Other expenses..........	--	559,000	--	559,000	--	--
Total..............	105	2,023,000	105	2,127,000	--	+ 104,000

The NMAC, located in Atlanta, Georgia, administers programs aimed at improving the quality and use of biomedical audiovisuals in schools of the health professions and throughout the biomedical community.

Following recommendations of the Board of Regents of the National Library of Medicine, NMAC was reorganized in 1971 to shift a major portion of its resources to acquisition, distribution, and reference services; educational research and consultation; and systems evaluation and application. Under its revised operating policies, NMAC acquires audiovisual materials which have been reviewed for their direct relevance to contemporary professional education in the health sciences. The Center also supports such education through media production workshops, seminars, conferences, training programs, and on-site surveys. These are designed to assist in the rapid development of health manpower.

In 1972 the Center will expand the acquisition and evaluation of materials to support its professionally-oriented distribution activity. A significant number of educational materials will be produced and field-tested in cooperation with health professionals and institutions, and experimentation will continue in the design and production of modular audiovisual units which can be excerpted, updated, and restructured by health professional educators to meet their individual needs. The Center also will continue to explore the value of new instructional packages for self instruction within NMAC and within cooperating educational institutions throughout the country.

Library Operations

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..........	247	$3,514,000	247	$3,773,000	--	+$259,000
Other expenses..........	--	4,502,000	--	4,352,000	--	- 150,000
Total..............	247	8,016,000	247	8,125,000	--	+ 109,000

Library Operations provides bibliographic, reference, and loan services as a central resource for a nationwide network of regional and local medical libraries. Approximately 250,000 such services were provided in 1971 at the NLM in addition to an estimated 305,000 provided by the regional libraries.

More than 95 percent of document requests originating in all regions of the country are now being filled more promptly than ever before. Eighty-five percent are filled in approximately three days as compared to a week or more in the past. One factor responsible for the reduction in time is that document requests are now transmitted by telecommunications. The NLM indexes annually about 210,000 medical and health articles for inclusion in Index Medicus, a comprehensive monthly listing of citations to current world-wide biomedical literature. Fifty-five hundred subscriptions to the publication were sold by the Superintendent of Documents in 1970. Citations are stored in the computerized Medical Literature Analysis and Retrieval System (MEDLARS) and retrieved for publication of Index Medicus, Cumulated Index Medicus (an annual product of about 10,000 pages with sales of approximately 4,500), and various recurring bibliographies which are prepared for and supported by specialty groups in fields such as medical education, dentistry, neurosurgery, and epidemiology. The data base also is used to provide on request over 20,000 bibliographies to health professionals.

In January 1971, the Library began publishing a new bibliography, "Selected References on Environmental Quality as it Relates to Health," which provides ready access to all of the material in the MEDLARS data base pertaining to environmental health.

Another new NLM publication appeared in 1970. Abridged Index Medicus, which contains information from 100 high quality English language journals selected with particular reference to their orientation to patient care and the training of health manpower, is particularly suitable for small hospitals. During 1970, more than 3,000 subscriptions to the monthly publications were sold, and a cumulated volume of Abridged Index Medicus also was produced.

During 1971, a graphic image storage and retrieval system, containing microfilms of documents from publications in greatest demand, will become operational. With a capacity of about 200,000 documents this system will provide rapid and reliable document delivery for interlibrary loans on an automated basis. Delivery of equipment is scheduled for the Spring of 1971.

The National Library of Medicine also publishes a computer-generated Current Catalog, which provides announcement and cataloging information for medical libraries throughout the world. A recently developed computer-generated announcement service, appearing on a semi-weekly basis, was implemented in 1970. Published in cooperation with the Medical Library Association, the publication is providing announcement and citation data for almost 300 libraries in the U.S. and saves many small libraries the cost of redundant cataloging.

During 1970, Library Operations field-tested and evaluated the AIM/TWX on-line bibliographic retrieval system developed cooperatively with the Lister Hill Center.

As a result of successful field-testing, an expanded data base and network for the system will be extended to all the regional libraries and MEDLARS centers and will be integrated with MEDLARS II as its on-line component. Implementation is scheduled for the end of 1971.

The request for Library Services in 1972 is $4,518,000 and 195 positions. These funds will permit the processing of 116,000 interlibrary loan requests; 19,000 domestic computer-generated demand searches; 80,000 reader requests (direct use of the collection); indexing of 230,000 articles; and publication of 21 recurring bibliographies. The funds will also permit the Library's collection to be augmented by 110,000 serial pieces and 40,000 monographs. Maintenance of the collection will include the binding of 22,000 volumes and the preservation and graphic image storage microfilming of 700,000 pages.

Development and implementation of a second-generation MEDLARS (MEDLARS II)

The National Library of Medicine began the development of a second-generation Medical Literature Analysis and Retrieval System (MEDLARS II) in 1968 through a major contract with the Computer Sciences Corporation. The contract included responsibilities for system analysis, design and software implementation, and the MEDLARS II plan called for a three to four year project of development and incremental upgrading.

Under present project schedules, implementation of the first phases of MEDLARS II will take place in about the second quarter of fiscal 1972. This delay is due principally to an underestimate of the magnitude of the task to be accomplished. When completed, the new system should provide important systems support to several technical functions within the Library.

In full operation, MEDLARS II will incorporate the following technical elements: increased processing capability; internal on-line storage devices permitting direct access to the data base; multi-programming capability which will permit several tasks to be performed by the computer simultaneously; and limited on-line access to data bases from remote terminals. Translated into program capabilities, the new features will provide for: a greatly increased file capacity to allow the maintenance of abstracts, summaries, and bibliographic service requests; the processing of more current data through direct input and on-line updating of the file; an automated acquisition and cataloging system with availability of cataloging data to and from medical libraries; development of specialized information files to support the Library's toxicology information programs through the addition of chemical name and structure search capabilities; and, support of data processing and data transmission activities of the biomedical communications network.

Experience with the MEDLARS II system as developed thus far has led to the conclusion that the present hardware configuration is not capable of handling the tasks involved in the development work and that a more sophisticated computer will be required for implementation. Funds to provide for this upgrading on a lease basis are included in the 1972 budget request.

The 1972 request includes $3,607,000 and 52 positions to operate the MEDLARS I system and to continue development, implementation, and operation of the MEDLARS II system, including lease of a more sophisticated computer configuration.

Toxicology Information Program

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	18	$ 349,000	18	$ 374,000	--	+$25,000
Other services...........	--	888,000	--	863,000	--	- 25,000
Total................	18	1,237,000	18	1,237,000	--	--

The Toxicology Information Program (TIP) was established by Presidential order following recommendations of the President's Science Advisory Committee on the Handling of Toxicological Information (1966). In 1967, responsibility for its implementation was delegated to the National Library of Medicine by the Secretary of Health, Education, and Welfare.

Toxicological data currently are dispersed among numerous non-mechanized and uncoordinated information sources. The mission of the Toxicology Information Program is to provide for the selection, analysis and automated storage and retrieval of such information. The effective implementation of the program requires close collaboration with other government agencies and the creation of a capability to respond to requests for information. This in turn requires access to toxicology information from scientific literature and the files of government and industry.

Collaborative Activities with Other Organizations:

The TIP has developed (1) a computerized data bank for 400 primary pesticide petitions (in cooperation with the FDA and the newly-created Environmental Protection Agency); (2) a centralized automated data system for studies of individuals occupationally exposed to pesticides; (3) an on-line computerized search system based on the journal, Health Aspects of Pesticides Abstract Bulletin; (4) a computerized index to the Report of the Secretary's Commission on Pesticides and Their Relationship to Environmental Health; (5) a comprehensive bibliography on a selected list of food additives generally recognized as "safe;" and (6) has maintained and enhanced a data base of 35,000 chemicals of major biomedical interest.

In 1972, efforts will be directed toward the maintenance of current working agreements and the initiation of new agreements with governmental agencies which either have files of interest to the Toxicology Information Program or needs for TIP products and services. Attempts will be made to establish similar collaborative arrangements with academic and industrial organizations. Specifically, efforts will be made to organize data bases which are initiated, maintained, and directed by the Toxicology Information Program, but financially supported by other Federal agencies and private institutions which will use the system.

Development of Specialized Files Based on the Published Literature:

In 1970 and 1971, TIP's activities included (1) the preparation of a publication on drug-drug and drug-chemical interactions; (2) creation of a computerized service ("Toxitapes") for industrial and pharmaceutical toxicology based on articles selected from Biological Abstracts; (3) enrichment of the NLM's on-line Abridged Index Medicus retrieval system by the addition of journals having clinical toxicology content; and (4) preparation for a journal on the "health effects of environmental pollutants" containing 13,000-14,000 abstracts per year.

Automated Systems:

The TIP has completed the evaluation of a pilot computer system to handle toxicology data. In 1972, the program will attempt to take advantage of software systems already owned or under development by the Federal Government. Activities in 1972 will include minimum maintenance of the Toxicology Roster System, extension and expansion of the interaction of MEDLARS and Chemical Abstracts systems, and extension of the Toxicology Vocabulary.

Query Response Center:

TIP has established an information analysis center for pesticides and environmental toxicology at the Atomic Energy Commission's Oak Ridge National Laboratories. Funded and supervised by TIP, the center draws on scientists from various disciplines on an ad hoc basis. It can thus respond to queries from the scientific community by providing in-depth literature searches and data analysis and state of the art reports. In addition, the specialized data files assembled by the Toxicology Information Program are accessible to the center.

Review and Approval of Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	32	$541,000	32	$580,000	--	+$39,000
Other services...........	--	124,000	--	124,000	--	--
Total...............	32	665,000	32	704,000	--	+ 39,000

This activity provides the administrative staff and program direction for the six grant programs authorized by the Medical Library Assistance Act of 1965 and its extension act of 1970, as well as for the international activities of the NLM which are funded by the Scientific Activities Overseas appropriation.

The increase of $39,000 is for pay increases.

Program Direction

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits...........	55	$ 864,000	55	$ 915,000	--	+$51,000
Other services...........	--	1,343,000	--	1,383,000	--	+ 40,000
Total...............	55	2,207,000	55	2,298,000	--	+ 91,000

Program direction provides support for the immediate Office of the Director, the Office of Administrative Management, the Office of Public Information and Publications Management, and payment to the National Institutes of Health Management Fund for centrally furnished services. The activity thus provides the program leadership and centralized administrative support necessary for the coordinated operation of the various NLM activities.

The increase of $91,000 is for costs of services furnished through the NIH Management Fund, and pay cost increases.

Program Purpose and Accomplishments

Activity: Training Grants (Medical Library Assistance Extension Act of 1970, P.L. 91-212, Section 394)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$1,000,000	$1,750,000	---	$1,000,000

Purpose: The training program authorized by the Medical Library Assistance Act, and extended by the Medical Library Assistance Extension Act of 1970, is intended to help meet the Nation's need for medical librarians and other medical information specialists. The emphasis of the program is on training for creative leadership in positions of major responsibility.

Explanation: Project grants are awarded to institutions to assist individuals in obtaining post-baccalaureate degrees, to librarians or other biomedical information specialists for intensive training or retraining, and to institutions for the support of training programs and medical library internships.

Accomplishments in 1971: It is estimated that 12 grants will be awarded in Fiscal Year 1971. Of these, seven are continuations of previously awarded projects and five will be new awards.

Objectives for 1972: The estimate for Fiscal Year 1972 provides the same level of funds as in 1971. This will allow the Library to support 11 projects. Of these 11, 7 will be continuations and 4 will be new awards, which will support an estimated 100 trainees.

Activity: Special Scientific Project Grants (Medical Library Assistance Extension Act of 1970, P.L. 91-212, Section 395a)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$5,000	$500,000	---	$95,000

Purpose: The grants are intended to support outstanding scholars in full-time analysis and documentation of major advances in the health sciences, the results to be published as monographs on advances in biomedicine.

Explanation: Project grants are awarded to physicians and other health sciences practitioners, scientists, and public or non-profit private institutions on behalf of such people.

Accomplishments in 1971: It is estimated that one project grant will be partially supported in 1971.

Objectives in 1972: The $95,000 in Fiscal Year 1972 will provide support for three projects by highly qualified scholars to synthesize the literature in their particular fields.

Activity: Research Grants (Medical Library Extension Act of 1970, P.L. 91-212, Section 395b)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$590,000	$3,000,000	---	$600,000

Purpose: The intent of the research grants program is to develop methods of processing and making accessible the rapidly growing body of biomedical information. If such information is to have the maximum amount of impact on further research in the health-related sciences and ultimately on health care, an enhanced capability for processing, storing, and retrieving the data is essential.

Explanation: Project grants are made for research, investigations, and demonstrations in medical library science and for the development of new techniques, systems, and equipment for the processing of biomedical information.

Accomplishments in 1971: It is estimated that 20 grants will be awarded in Fiscal Year 1971. Of these, 11 will be non-competing continuation awards and 9 will be new projects.

Objectives for 1972: The request for 1972 will permit the support of 14 non-competing continuation grants and 3 new awards.

Activity: Library Resource Grants (Medical Library Assistance Extension Act of 1970, P.L. 91-212, Section 396)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$2,205,000	$3,500,000	---	$2,105,000

Purpose: The purpose of the grants is to provide financial assistance and incentive for improving the basic materials, equipment, and services of medical libraries. The emphasis is on rapidly upgrading the medical libraries supported by hospitals, educational institutions, and medical societies.

Explanation: Project grants are made for the acquisition of books, journals, and other materials; cataloging, binding, and other processing services; acquisition of duplicating and other equipment to facilitate service; and the introduction of new technologies in medical librarianship. No grant may exceed $200,000 for any fiscal year, and the Secretary may prescribe grant amounts with a view to assuring adequate continuing financial support from other sources during and after the period of Federal assistance.

Accomplishments in 1971: The Library expects to make 541 awards in 1971; 394 will be continuing projects and 147 will be new grants.

Objectives in 1972: The requested level in 1972 will allow the support of 165 continuing grants and 241 new ones for a total of 406 awards.

Activity: Regional Medical Libraries Grants (Medical Library Assistance Extension Act of 1970, P.L. 91-212, Section 397).

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$1,912,000	$3,250,000	---	$2,002,000

Purpose: The program is intended to develop a system of Regional Medical Libraries with the scope and depth necessary to supplement significantly the services of local medical libraries in each region. Backup services to such libraries include inter-library loans, MEDLARS literature searches, and other reference services to user organizations. The Regional Medical Library is of particular benefit to medical practitioners who lack access to a major medical library.

Explanation: Project grants are awarded to improve regional service in libraries selected because they already have a sound base. In 1970 complete geographic coverage was achieved with the establishment of the Mid-Continental Regional Library located in Omaha, Nebraska and the South Central Regional Library located in Dallas, Texas.

Accomplishments in 1971: In 1971, 10 continuing projects will be supported.

Objectives in 1972: The 1972 request represents a $90,000 increase. This amount will allow the Library to maintain the support of the ten active regional libraries and will cover the increased costs of operation and some increase in service to meet rising service demands.

Activity: Publications support grants (Medical Library Assistance Extension Act of 1970, P.L. 91-212, Section 398)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$280,000	$1,000,000	---	$290,000

Purpose: This program assists in the development of useful, selected publications to help American health professionals digest and utilize the tremendous output of new information in the biomedical sciences.

Explanation: Project grants provide support for the preparation, and/or publication of secondary tools such as abstracts, bibliographies, handbooks, and critical reviews, as well as monographs and translations which condense, synthesize, evaluate, or otherwise repackage information for health scientists, educators and practitioners.

Accomplishments in 1971: It is estimated that 17 grants will be awarded in Fiscal Year 1971. Of these, five will be continuing projects and twelve are new projects.

Objectives for 1972: The 1972 request will provide support for 14 projects; 7 continuing projects and 7 new projects.

Activity: Lister Hill National Center for Biomedical Communications

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
10	$1,370,000	--	17	$1,398,000

Purpose: The Lister Hill National Center for Biomedical Communications provides a mechanism for the transfer of computer and communications technology to improve biomedical research, medical education, and health care delivery.

Explanation: The Lister Hill Center maintains a program to identify new developments in information technology. In parallel, it reviews the needs of the medical community to identify areas of need which could be met by the application of such technology. On the basis of correspondence between priority needs and technological capabilities, the Center develops experimental services and manages their evaluation.

Accomplishments in 1971: In 1971, the Center has demonstrated the utility of on-line bibliographic access in more than 30 hospitals, libraries, and medical research facilities. The Center has experimented with satellite communications for voice, data, facsimile, and analog signals and has planned a major experiment with Alaska to test this new communication modality. The Center is evaluating an experimental, two-way TV link for patient care and medical education and has planned a communications network for medical schools and hospitals in Vermont and New Hampshire. Three other projects have been directed toward cooperative development of multimedia educational materials to be shared by medical schools.

Objectives in 1972: The requested funding in 1972 will allow the operational test of satellite communications in Alaska and the development of the initial portions of a network in Vermont and New Hampshire. It will provide augmented in-house staff for the Center to meet the growing demand for managerial and technology transfer functions. It will permit the transition of the experimental on-line bibliography to an operational service to the medical community. Finally, it will allow new initiatives in experiments related to communication services into homes via cable and audio playback systems.

Activity: National Medical Audiovisual Center

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
105	$2,023,000	--	105	$2,127,000

Purpose: The Center administers programs to improve the quality and use of biomedical audiovisuals in schools of the health professions and throughout the biomedical community.

Explanation: NMAC acquires, organizes, and distributes audiovisuals; provides educational research and consultation; and performs reference services and evaluation of audiovisual systems.

Accomplishments in 1971: NMAC provided approximately 100,000 units of educational service or assistance in 1971 to well over 31,000 representatives of schools of the health sciences or organizations of the biomedical community. The services included educational consultation, workshops, and seminars, national conferences, systems surveys, video tape duplications, reference services, audiovisual loans, and assistance to professional groups in the development and evaluation of instructional materials.

Objectives for 1972: The Center will expand its acquisition and distribution activities; produce and field-test educational materials in cooperation with health professionals; and experiment with self-instructional technology and with modular audiovisual units valuable for their ease of up-dating and flexibility of use. The reallocation of resources within the Center which was initiated in 1971 will permit approximately a 20 percent increase in the amount of educational services rendered and the number of professionals served.

Activity: Library Operations

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
247	$8,016,000	--	247	$8,125,000

Purpose: In order to advance medical and related sciences through the collection, organization, and dissemination of biomedical information, the Library acquires and maintains materials pertinent to biomedicine; compiles and publishes catalogs, indices, and bibliographies of such materials; and provides reference and other assistance to practitioners, students, and researchers.

Explanation: Under this activity the Library acquires and catalogs materials and analyzes and indexes biomedical literature for incorporation into MEDLARS, the NLM's computerized bibliographic information storage and retrieval system. From the MEDLARS data base the Library publishes Index Medicus, 23 other specialized bibliographies of journal articles, and a Current Catalog of recently acquired books, monographs, and technical reports, The Library also manages and coordinates a network of domestic and foreign MEDLARS stations to obtain indexing of the world's most important biomedical literature and to disseminate MEDLARS services widely in the United States and abroad; and, through its History of Medicine Division, acquires, organizes and maintains the historical source materials of biomedicine.

Accomplishments in 1971: The NLM rendered approximately 250,000 services in its dual capacity as a central national backup facility and as one component in a network of regional libraries. Such services included bibliographic references and interlibrary loans from the collection. In addition, the Library indexed roughly 210,000 articles for inclusion in the monthly Index Medicus (to which in 1970 there were 5,500 subscriptions) and published the annual Cumulated Index Medicus, a product of about 10,000 pages with sales of approximately 4,500. In 1971 the Library began publication of a new bibliography, Selected References on Environmental Quality as it Relates to Health, and continued publishing the monthly and annual volumes of Abridged Index Medicus, to which 3,000 subscriptions were sold in 1970 and which has been found particularly suitable for individual practitioners and for small hospital libraries. Also becoming operational in 1971 is a graphic image storage and retrieval system containing microfilms of documents from publications most in demand, with a capacity of about 200,000 documents, which will provide rapid, automated delivery of interlibrary loans.

Objectives for 1972: Plans for 1972 call for continuation of the operations outlined above at approximately the same level of activity. Specifically, the Library anticipates that it will process 116,000 interlibrary loan requests; perform 19,000 domestic computer-generated demand searches of the biomedical literature; process 80,000 reader requests; index 230,000 articles; publish 21 recurring bibliographies; augment the collection by 110,000 serial pieces and 40,000 monographs; bind 22,000 volumes; and microfilm a total of 700,000 pages.

Activity: Toxicology Information

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
18	$1,237,000	--	18	$1,237,000

Purpose: The Toxicology Information Program supports the development and operation of a computer-based toxicology information system and accompanying information products and services to satisfy the needs of other agencies, industry, the scientific community and the public at large.

Explanation: Toxicological information and data are currently scattered among numerous non-mechanized and uncoordinated information sources. The Toxicology Information Program is organizing toxicologic data to facilitate retrieval and provide information upon request through automated processing.

Accomplishments in 1971: The program collaborated extensively in 1971 with other Federal agencies to automate pesticide petition toxicology data (EPA/FDA) and human epidemiological data on pesticides (EPA); established a Query Response Center (Oak Ridge National Laboratory, AEC) to provide a toxicological information analysis function for the scientific community; extended the development and use of specialized toxicological information and data files (e.g., a roster of 3,100 toxicology experts, a file of 1,000 biomedical professionals' information usage needs, and a data base of toxicology on 1,000 chemicals); initiated development of new information products and services (e.g., "Toxitapes" covering industrial and pharmaceutical toxicology, a Drug Interaction Bibliography, a computer-based abstract journal on the "Health Aspects of Environmental Pollutants," and a Toxicology Thesaurus).

Objectives for 1972: The TIP will emphasize in 1972 its collaborative efforts with other Federal agencies and establishment of similar activities with academic and industrial organizations; continuation of the activities and capabilities of the Query Response Center; initiation, development and dissemination of new products and services to meet user needs; and continuation of the development, maintenance, expansion and dissemination of specialized toxicological information and data files, with special emphasis on pesticides and other bio-environmental toxicants.

Activity: Review and Approval of Grants (Public Health Service Act, Title II, Part I)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
32	$665,000	--	32	$704,000

Purpose: This activity provides support for staff to manage the six grant programs authorized by the Medical Library Assistance Act of 1970, as well as international activities of the NLM funded by the Scientific Activities Overseas appropriation.

Explanation: The functions of this office include the processing of grant applications and their review by program officers, staff assistance to reviewing committees, grants management and direction, and program review and evaluation.

Accomplishments in 1971: This office provided the administrative support and program leadership necessary for a coordinated approach to the development of biomedical communications materials and systems.

Objectives for 1972: This activity will direct a portion of its efforts towards implementing the redirections of the NLM training grant program. Steps are currently being taken to train more medical librarians without significantly increasing cost. At present, schools of librarian science graduate a large number of students each year with a master's degree in librarianship. Conceivably the graduates could be converted to medical librarians faster and less expensively than is now required to produce a medical librarian starting at the baccalaureate degree level.

Activity: Program Direction (Public Health Service Act, Title III, Part I)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
55	$2,207,000	--	55	$2,298,000

Purpose: This activity provides the program leadership and centralized administrative support necessary for the coordinated operation of the various NLM activities.

Explanation: Program direction provides support for the immediate Office of the Director, Office of Administrative Management, the Office of Public Information and Publications Management, and payment to the National Institutes of Health Management Fund for centrally furnished services.

Accomplishments in 1971: Supervision of NLM activities throughout the fiscal year.

Objectives for 1972: Efforts in 1972 will be directed towards the development of new and the improvement of current systems being utilized in the dissemination of biomedical data. Specific emphasis is being placed on the systems design for the distribution of toxicity information utilizing MEDLARS II and the Lister Hill Center's Biomedical Communications Network. Additionally, a concerted effort is being made to provide entry to MEDLARS via chemical nomenclature. There will be an additional emphasis on overall program evaluation and analysis.

NEW POSITIONS REQUESTED
Fiscal Year 1972

	Grade	Number	Annual Salary
Lister Hill National Center for Biomedical Communications			
Medical Officer	GS-15	1	$24,251
Information Specialist	GS-14	1	20,815
Engineer	GS-14	1	20,815
Information Specialist	GS-12	1	15,040
Electronics Technician	GS-11	1	12,615
Statistician	GS-9	1	10,470
Secretary	GS-7	1	8,582
Total, New Positions		7	$112,588

National Library of Medicine

STATEMENT OF DR. MARTIN M. CUMMINGS, DIRECTOR

ACCOMPANIED BY KENT SMITH

135TH ANNIVERARY

Senator MAGNUSON. The Library of Medicine, National Library of Medicine.

Dr. Cummings, we will be glad to hear from you.

Dr. CUMMINGS. Thank you, Mr. Chairman.

This is the 135th Anniversary of the National Library of Medicine.

BUDGET REQUEST AND 1971 APPROPRIATION

Senator MAGNUSON. Wait a minute before you start. How much did you have last year as against the budget request?

Here it is, $21,510,000 for 1971 and the budget request is down $541,925.

Dr. CUMMINGS. No, sir, I don't believe that is correct. It is $21,981,000, an increase of $471,000.

Senator MAGNUSON. Oh, there was a total down here, which was included under the health manpower. This is a separate item. $21,510,000, and $21,981,000; is that correct?

Dr. CUMMINGS. Yes, sir.

LIBRARY FUNCTIONS

Since its founding, the library has dedicated itself to provide effective communication among all members of the biomedical community to facilitate the progress of research, to prevent wasteful duplication of effort, and particularly to encourage the application of new knowledge to the treatment and prevention of illness.

VAST COLLECTION OF BIOMEDICAL LITERATURE

The National Library of Medicine, we believe, is the principal repository of the world's biomedical literature with a collection of more than 1.3 million items. Its Medlar system, a computer based information retrieval system, contains more than one million bibliographic citations to articles in 2,300 of the world's medical and health-related journals. Medlar produces the "Index Medicus" the Abridged Index Medicus, Current Catalog and a variety of specialized bibliographies to inform health personnel about current medical publications.

The Library is working now to develop a new Medlars system to extend its prototype capabilities. We have already introduced successfully an online computer system which we would now like to nationalize through upgrading our computer hardware.

Through the extramural programs of the National Library, we have awarded 600 grants to medical and related health libraries to strengthen their collections, to improve their manpower, ultimately to improve the services given to the health community.

LISTER HILL CENTER

The Lister Hill Center, created by Joint Resolution of Congress in 1968 has been designated as the department's focal point for the coordination of biomedical communications systems and networks. It has been assigned the responsibility for applying new communications technology to assist in information delivery.

The center is cooperating with NASA, the University of Washington, the University of Wisconsin, and Stanford University, in using satellite communications technology to conduct and expand technical experiments which permit verbal consultation and data transmission between health aides and physicians in Alaska, particularly in the remote areas.

Also the Center has initiated an interactive television communications network for Vermont and New Hampshire where physicians may be assisted in their continuing education and patient care activities.

Lister Hill Center Building

The program of requirements for the Lister Hill Center building has been completed. It has been approved by the National Institute of Health and now awaits approval by the Department and the Office of Management and Budget before we proceed with our architectural and engineering design.

We have established a toxicology information program to provide data on the harmful effects of selected chemical compounds in humans. Among its efforts directed toward bringing such data from many sources into a coordinated computerized storage and retrieval system we have developed a directory of toxicological information sources. We have compiled a toxicity bibliography which is produced regularly and an organized registry of 30,000 chemical compounds potentially important to health interests.

1972 PLANS

Plans for the next fiscal year include the creation of a Medlar generated abstract journal to be known as *Health Effects of Environmental Pollutants.*

Query Response Center at Oak Ridge

We have established cooperatively with the Atomic Energy Commission a query response center at Oak Ridge National Laboratory where experts in the field provide specialized information responses to particular queries.

National Medical Audiovisual Center

Finally, the Library maintains in Atlanta, Ga., its National Medical Audiovisual Center. It serves as the department's central resource for the acquisition, distribution, and utilization of medical films, video tapes, and other audiovisual material. We have deemphasized our own production activities to concentrate on upgrading the quality of acquisitions, improving the system of distribution and increasing the Center's technical consultation to academic institutions.

COOPERATION WITH BUREAU OF HEALTH MANPOWER EDUCATION

I am pleased to tell you, Mr. Chairman, that we are working cooperatively with the Bureau of Health Manpower Education to develop a new multimedia program through which we hope to produce innovative teaching aids to be provided for the dental, nursing, and health-related professions, as well as medicine.

This summarizes briefly some of the on-going programs and some of our program plans.

As you pointed out a few minutes ago, we are requesting $21,981,000, an increase of $471,000 over last year's amount. This increase will provide for the annualization of pay costs and other mandatory increases.

Senator MAGNUSON. Thank you, Doctor.

ALASKAN SATELLITE COMMUNICATIONS PROGRAM

Naturally, the people from Alaska are wondering whether under this budget you will continue this experimental satellite program in Alaska.

Dr. CUMMINGS. We will continue to develop the satellite communications effort in Alaska. We have begun to install our small antenna and transceivers and are sharing these installations with the Office of Education who also intend to make use of these resources.

The full implementation of the program, however, will not be possible within the present allocation of funds.

AGREEMENT WITH NASA

Senator MAGNUSON. Is there any agreement with NASA on the use of the satellites?

Dr. CUMMINGS. Yes; there is a very important agreement with NASA. This program could not proceed without their making available to us one of the older satellites which is not being fully used for other purposes. We have, in addition to that basic agreement, very fine technical support from the staff at NASA.

Senator MAGNUSON. The Senators from Alaska say they hope to be able to keep this experiment going, especially in expending the service for emergency signaling through the satellite and examining the possibilities of using radios on bush planes as emergency links on an experimental basis.

Do you know about that?

Dr. CUMMINGS. I have heard that mentioned, but I am not able to tell you that the airplane linkage aspect of this program will be funded within our present resources. At the moment, we are concentrating on what we have called mayday type of help assistance where an aide confronted with an emergency problem in a remote station can talk to some competent professional in a nearby clinic or hospital.

Senator MAGNUSON. Then they asked, speaking of the NASA agreement for experimental satellites, are they considering possible expansion of medical tests into the Northwest part of the United States and for links in other areas?

Dr. CUMMINGS. Yes. This is definitely part of the library's plan. We are working with engineering and medical groups in Seattle, in Palo Alto, and in Madison, Wis.

REQUEST LIBRARIES

Senator MAGNUSON. How many regional centers do you have?

Dr. CUMMINGS. We support 10 regional libraries throughout the country and, in addition, the National Library serves as the regional library for the Mid-Atlantic States.

Senator MAGNUSON. There was some pretty potent testimony mainly by Luther Terry and Senator Humphrey, who came to us personally about this. They just thought we ought to put a small amount more in this item. They had a figure of $1 million or something like that, $750,000. But we will take a look at it and see.

Dr. CUMMINGS. There is an interesting difference in the two figures cited. Obviously I will wait for your judgment with some anticipation.

Senator MAGNUSON. Well, we will take a look at it anyway.

Now, we will take a seventh inning stretch, because I don't want to miss another vote.

(Brief recess.)

NATIONAL INSTITUTES OF HEALTH

OFFICE OF THE DIRECTOR

Justifications

Appropriation Estimate

OFFICE OF THE DIRECTOR

For expenses necessary for the Office of the Director, National Institutes of Health, [$8,206,000] *$11,442,000.*

Appropriations in this Act available for the salaries and expenses of the National Institutes of Health shall be available for entertainment of visiting scientists when specifically approved by the Surgeon General: *Provided,* That not to exceed $5,000 shall be used for this purpose.

Funds advanced to the National Institutes of Health management fund from appropriations in this Act shall be available for the expenses of sharing medical care facilities and resources pursuant to section 328 of the Public Health Service Act and for the purchase of not to exceed [twenty-one] *eleven* passenger motor vehicles [, of which twelve shall be] for replacement only.

Amounts Available for Obligation

	1971	1972
Appropriation	$8,206,000	$11,442,000
Real transfer from:		
"National Eye Institute"(Proposed transfer for increased pay costs)	461,000	---
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs)	236,000	---
Comparative transfer to:		
"Departmental Management"	-21,000	---
Comparative transfers from:		
"Biologics Standards"	28,000	---
"National Cancer Institute"	151,000	---
"National Heart and Lung Institute"	71,000	---
"National Institute of Dental Research"	31,000	---
"National Institute of Arthritis and Metabolic Diseases"	810,000	---
"National Institute of Neurological Diseases and Stroke"	67,000	---
"National Institute of Allergy and Infectious Diseases"	643,000	---
"National Institute of General Medical Science"	21,000	---
"National Institute of Child Health and Human Development"	47,000	---
"National Eye Institute"	8,000	---
"National Institute of Environmental Health Sciences"	22,000	---
"John E. Fogarty International Center for Advanced Study in the Health Sciences"	6,000	---
"Research resources"	10,000	---
"Health manpower"	36,000	---
"Dental health"	15,000	---
"National Library of Medicine"	38,000	---
Total, obligations	10,886,000	11,442,000

Obligations by Activity

Page Ref.		1971 Estimate Pos.	1971 Estimate Amount	1972 Estimate Pos.	1972 Estimate Amount	Increase or Decrease Pos.	Increase or Decrease Amount
141	Program direction and management services	525	$10,886,000	527	$11,442,000	+2	+$556,000
	Total obligations	525	10,886,000	527	11,442,000	+2	556,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions....................	525	527	+2
Full-time equivalent of all other positions..............	30	30	--
Average number of all employees....................	520	521	+1
Personnel compensation:			
Permanent positions..........	$6,853,000	$7,249,000	+$396,000
Positions other than permanent....................	222,000	233,000	+11,000
Other personnel compensation......................	158,000	163,000	+5,000
Subtotal, personnel compensation..............	7,233,000	7,645,000	+412,000
Personnel benefits.............	607,000	640,000	+33,000
Travel and transportation of persons.......................	112,000	112,000	---
Transportation of things........	8,000	8,000	---
Rent, communications and utilities.....................	212,000	216,000	+4,000
Printing and reproduction.......	211,000	211,000	---
Other services:			
Payment to NIH Management Fund.	1,311,000	1,442,000	+131,000
Other.........................	1,056,000	1,032,000	-24,000
Supplies and materials..........	86,000	86,000	---
Equipment......................	53,000	53,000	---
Quarters and subsistence........	-3,000	-3,000	---
Total obligations by object.	10,886,000	11,442,000	+556,000

Summary of Changes

1971 estimated obligations	$10,886,000
1972 estimated obligations	11,442,000
Net change	+556,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	---	---	---	+$275,000
2. Extra day's pay	---	---	---	+29,000
3. Within-grade pay increases	---	---	---	+117,000
4. FTS rate increase	---	---	---	+4,000
B. Program:				
1. Program direction and management services	525	$9,575,000	+2	+24,000
C. Payments to "NIH Management Fund" for centrally furnished services	---	1,311,000	---	+131,000
Total, increases	---	---	+2	+580,000
Decreases:				
A. Program:				
1. Program direction and management services	525	9,575,000	---	-24,000
Total, decreases	---	---	---	-24,000
Total, net change	---	---	+2	+556,000

Explanation of Changes

Built-in Increases -- These increases will provide: $275,000 for annualization of 1971 pay increase costs; $29,000 for the extra day of pay in 1972; $117,000 for within-grade pay increases in 1972; $4,000 for increased cost in 1972 of using the Federal Telecommunications System; and $131,000 for increased payments to the NIH Management Fund for centrally furnished services.

Program direction and management services -- The program increase of 2 positions and $24,000 will be required primarily for the additional responsibilities for analyses and evaluations of program development in the new initiative areas. Reduced information activities account for the reduction of $24,000.

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer from:		
National Eye Institute	$461,000	Proposed transfer for increased pay costs.
National Institute of General Medical Sciences	236,000	Proposed transfer for increased pay costs.
Comparative transfer to:		
Departmental management	-21,000	To provide central guidance and coordination of the total Career Development Program.
Comparative transfers from:		
Division of Biologics Standards	28,000)	Transfer of the research contracting functions from NIH Management Fund to Office of the Director for establishing the Office of Contracts and Grants.
National Cancer Institute	151,000)	
National Heart and Lung Institute	71,000)	
National Institute of Dental Research	31,000)	
National Institute of Arthritis and Metabolic Diseases	66,000)	
National Institute of Neurological Diseases and Stroke	67,000)	
National Institute of Allergy and Infectious Diseases	76,000)	
National Institute of General Medical Science	21,000)	
National Institute of Child Health and Human Development	47,000)	
National Eye Institute	8,000)	
National Institute of Environmental Health Sciences	22,000)	
John E. Fogarty International Center for Advanced Study in the Health Sciences	6,000)	
Research resources	10,000)	
Health manpower	36,000)	
Dental health	15,000)	
National Library of Medicine	38,000)	
National Institute of Arthritis and Metabolic Diseases	744,000)	To provide an equitable distribution of the management fund in 1972.
National Institute of Allergy and Infectious Diseases	567,000)	

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1970	$7,093,000	$7,093,000	$7,093,000	$7,323,341
1971	8,206,000	8,206,000	8,206,000	8,206,000
1972	11,442,000			

Program Direction and Management Services

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.............	525	$7,837,000	527	$8,282,000	+2	+$445,000
Other expenses............	...	3,049,000	...	3,160,000	...	+111,000
Total................	525	10,886,000	527	11,442,000	+2	+556,000

General Statement

The Office of the Director appropriation provides for: (1) the overall direction of the National Institutes of Health, including the immediate office of the Director and the offices responsible for program planning and evaluation, and scientific and public communications; and (2) supporting management services including financial management, personnel management, management policy and review, and grants and contract management.

Program Plans for 1971 and 1972

Executive direction of NIH will reflect a continuing emphasis on making the NIH organization an effective instrument for furthering and coordinating programs in support of the interrelated fields of biomedical research, health professions education and manpower training, and biomedical communications. This involves the collection and evaluation of data, the review and analysis of program issues and proposals, the appraisal of on-going programs, the development of policy position papers and the preparation of long-range program plans, as well as the preparation of information and its dissemination to the scientific and educational communities and to the general public.

The central management services financed by this appropriation support not only the overall direction and management of NIH but also provide a number of services to the individual Institutes and the other operating components of NIH. Financial management includes budget formulation and execution, financial reporting and analysis, grant payment and settlement, and accounting and voucher auditing for over 140 budget activities. Personnel management provides over 11,000 employees with a wide variety of personnel services, including training and employee development, classification and salary administration, employee and labor relations, equal employment opportunities, and recruitment and placement of a great variety of professional and support jobs. Management studies and review are undertaken to promote economy and efficiency of operations and to identify possible weaknesses in policy and procedural controls. The central contracts and grants management services over 22,000 projects.

The net increase of $556,000 requested in 1972 consists of mandatory increases of $117,000 for within-grade pay increases, $29,000 for an extra day of pay, $4,000 for FTS cost increases, $275,000 for annualization of 1971 pay increase costs, and $131,000 for increased payments to the NIH Management Fund. A program increase of 2 positions and $24,000 is requested to expand our efforts for studying and evaluating program plans and progress. A program decrease of $24,000 represents a reduction in preparation, printing and distribution of information monographs.

Program Purpose and Accomplishments

Activity: Program direction and management services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
525	$10,886,000	N/A	527	$11,442,000

Purpose: The purpose of this activity is to provide overall program direction and central management services to the Bureaus, Institutes and Divisions of the National Institutes of Health.

Explanation: The functions and responsibilities of this activity are carried out through the offices of various associate directors and appropriate office directors with aid of staff specialists and operating personnel.

Accomplishments in 1971: In this activity, significant accomplishments were: (a) Initiated a study of graduate education and postdoctoral training in the biomedical sciences for the purpose of obtaining information relevant to the evaluation of the NIH training programs. (b) Increased minority employment and expanded the equal employment opportunities program. (c) Established a grants and contracting office. (d) Indirect cost management system became operational. (e) Accounts were converted to the umbrella accounting system.

Objectives for 1972: Program direction and management services will accentuate the following: (a) Completion of the study on the evaluation of the NIH training programs. (b) Strengthen and expand the equal employment opportunities program. (c) Intensify and broaden the NIH program evaluation effort. (d) Achieve greater utilization and potential of the umbrella accounting system. (e) Achieve an overall strengthening of the NIH grants and contracting operations. (f) Redesign the Grants Management Fund to be more effective and responsive to the requirements of the overall DHEW.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Program direction and management services			
Program Analyst	GS-13	1	$17,761
Program Analyst	GS-12	1	15,040
Total new positions...............		2	32,801

Justifications

Appropriation Estimate

GENERAL RESEARCH SUPPORT GRANTS

For general research support grants, as authorized in section 301(d) of the Public Health Service Act, there shall be available from appropriations available to the National Institutes of Health and the National Institute of Mental Health for operating expenses the sum of [$60,700,000] *$49,200,000: Provided,* That none of these funds shall be used to pay a recipient of such a grant any amount for indirect expenses in connection with such project.

Amounts Available for Obligation

	1971	1972
Total obligations....................................	54,200,000	49,200,000

Obligations by Activity

Page Ref.		1971 Estimate	1972 Estimate	Increase or Decrease
164	Grants:			
	(a) General research support.	$43,423,000	$40,800,000	-$2,623,000
	(b) Biomedical sciences support................	6,777,000	6,400,000	-377,000
	(c) Health sciences advancement awards............	4,000,000	2,000,000	-2,000,000
	Total obligations....	54,200,000	49,200,000	-5,000,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Grants, subsidies, and contributions (total obligations).........	$54,200,000	$49,200,000	-$5,000,000

Summary of Changes

1971 estimated obligations..	$54,200,000
1972 estimated obligations..	49,200,000
Net change..	-5,000,000

	Base	Change from Base
Decreases:		
Program:		
1. General research support..................	$43,423,000	-$2,623,000
2. Biomedical sciences support...............	6,777,000	-377,000
3. Health sciences advancement awards.........	4,000,000	-2,000,000
Total program decreases.............	---	-5,000,000

Explanation of Changes

Research grants--The program decrease of $5,000,000 will result in reduced awards and support to institutions eligible under the General Research Support and Biomedical Sciences Support programs and reflects the gradual phase out of the Health Sciences Advancement Award program.

The reductions were made on the premise that overall medical research efforts would be best served by programming the limited funds available to those areas of special initiatives.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation requested
Public Health Service Act Section 301(d)--Make....grants-in-aid to public or nonprofit universities, hospitals, laboratories, and other institutions for the general support of their research and research training programs..................................	Indefinite	$49,200,000

PUBLIC HEALTH SERVICE ACT

Title III--General Powers and Duties of Public Health Service

Part A--Research and Investigation

Appropriation

Section 301(d). Make----grants-in-aid to public or nonprofit universities, hospitals, laboratories, and other institutions for the general support of their research and research training programs: Provided, that such uniform percentage, not to exceed 15 per centum, as the Surgeon General may determine, of the amounts provided for grants for research or research training projects for any fiscal year through the appropriations for the National Institutes of Health may be transferred from such appropriations to a separate account to be available for such research and research training program grant-in-aid for such fiscal year.

General Research Support Grants

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$14,500,000	$16,000,000	$20,000,000	$20,000,000
1963	30,000,000	30,000,000	30,000,000	30,000,000
1964	30,000,000	30,000,000	30,000,000	30,000,000
1965	40,000,000	40,000,000	45,000,000	45,000,000
1966	45,200,000	45,200,000	50,000,000	45,200,000
1967	51,700,000	51,700,000	51,700,000	51,700,000
1968	61,700,000	61,700,000	75,000,000	61,700,000
1969	60,700,000	60,700,000	60,700,000	60,700,000
1970	60,700,000	60,700,000	65,700,000	60,700,000
1971	45,977,000	60,700,000	60,700,000	60,700,000
1972	49,200,000			

3. A preliminary model of an "audiodontic device, "that is, a system that provides audio-communication through the teeth, has been built and tested at the University of California, Los Angeles School of Dentistry. Development of miniaturized circuitry for an advanced model is underway.

4. At Washington University in St. Louis, a 5-gram radio transmitter has been developed which is small enough to be surgically implanted into the abdominal cavities of mice. The device transmits an ECG and body temperature signal a distance of 30 feet, and remains active for a month or more, depending on the size of the battery.

B. Stabilization of institutional activities.

1. By supporting key research faculty -

Dr. Seymour Lieberman of Columbia University College of Physicians and Surgeons was supported by GRSG funds. Dr. Lieberman's contributions to the biochemistry of the steroid hormones (which has been partially supported by this grant) have been recognized by his being awarded the highest honor of the American Endocrine Society, the Frederick Conrad Koch Award.

2. By preservation of valuable central research resources -

a. At Louisiana State University Medical Center, GRSG funds enabled the institution to maintain a colony of mice that is a tremendously valuable resource for investigations requiring a genetically refined strain of animals.

b. A similarly important mouse colony was preserved at Harvard Medical school through the use of GRSG funds. The importance of this colony is in the study of models whereby environment and certain agents such as sulfonylureas can alter the steady state levels of blood glucose in experimental animals and man.

3. By obtaining critically needed equipment -

a. State University of New York Downstate Medical Center obtained a liquid scintillation counter that has become a valuable research tool.

b. Michigan State University College of Veterinary Medicine is using its GRSG to equip new, special purpose, interdisciplinary research laboratories in Virology, Comparative Hematology, Anesthesiology, and Comparative Parasitology.

C. Establishment of new research entities.

1. The GRSG played an important role in the organization of the Division of Environmental Medicine in the Department of Community Medicine of the Mt. Sinai School of Medicine. This laboratory has become a major national resource for air pollution studies.

2. A BSSG project at the Massachusetts Institute of Technology involved the establishment of the Biomedical Engineering Laboratory at Boston City Hospital.

3. The University of California at Davis, a more recent HSAA grantee has moved vigorously in its program in comparative medicine which now involves more than 60 professional scientists from five schools and colleges of the University. The HSAA is making possible the interdisciplinary utilization of the unusual animal facilities available at Davis and more than 10 species are being investigated for comparative purposes with the ultimate objective of more accurate extrapolation to the understanding of human disease.

Justification

General Research Support Grants

	1971 Estimate	1972 Estimate	Increase or Decrease
General research support grants........	$43,423,000	$40,800,000	-$2,623,000
Biomedical sciences support grants.....	6,777,000	6,400,000	-377,000
Health sciences advancement awards.....	4,000,000	2,000,000	-2,000,000
Total............................	54,200,000	49,200,000	-5,000,000

General Statement

Under the aegis of its extramural research programs, the NIH has long recognized and supported the development of institutional research strength. Although primarily concerned with fostering categorical research efforts in its attack on the major health problems of this country, this agency is cognizant that the quality of that research is proportional to the quality of the institutions in which it is performed, for these institutions provide the environment in which the research will be performed, and the milieu in which future faculty and research investigators obtain their education and research training. It is imperative, therefore, that institutions engaged in the education of health professionals and in the conduct of biomedical research, have a vigorous research life. To this end the NIH provides non-categorical research grant funds to eligible institutions for the general support of health-related research and research training. These flexible funds assist the institution in achieving its self-conceived research goals and aspirations by permitting it to establish its own priorities in determining the use of these funds. This approach to institutional funding developed out of the realization that institutions that conducted categorical research in response to national needs, could develop imbalances in their overall research programs, and that little if any local control could be exerted over the direction of growth that might result because of such national programs. Consequently, two grant programs were initiated in an attempt to restore appropriate institutional control over institutional research. These two programs were the General Research Support Grant (GRSG) and Biomedical Sciences Support Grant (BSSG) programs. A third program, the Health Sciences Advancement Award (HSAA) was designed to assist health research institutions to join the ranks of the preeminent.

The hallmark of the programs under the General Research Support authority is that they provide flexible funds, to be used at the discretion of the grantee institutions, in fostering health-related research and research training. The following are a few examples of how this flexibility has resulted in significant research results:

A. Early recognition of research potential through pilot research projects.

1. While supported on a GRSG student research fellowship, a young graduate student, William Oppenheim, of the Georgetown University School of Medicine received a 1970 Borden Award for outstanding biomedical research by an undergraduate.

2. In September of 1970, a rechargeable cardiac pacemaker, developed at Johns Hopkins University School of Medicine, was selected as one of the one hundred top inventions of the year, by a panel of 33 leading scientists, engineers, and research administrators, as part of competition supported by Industrial Research, Inc., publishers of industrial and oceanography magazines.

Program Plans in 1971 and 1972

General Research Support Grants: In 1972, GRSG's will be awarded to approximately 333 institutions (schools of medicine, dentistry, public health, pharmacy, veterinary medicine, and nursing, hospitals, non-academic research institutes and state and municipal health departments). Over one-half of the funds will be distributed to schools of medicine. The dollar amount of each award will be derived by applying a formula to the level of appropriate NIH and/or NIMH research project grants received by the grantee institution during the preceding fiscal year.

With few exceptions, GRSG funds may be spent for the direct costs of research and research training at the discretion of the recipient institution. Such costs include salaries, student stipends, research equipment and supplies, and numerous other needs.

Biomedical Sciences Support Grants: This program complements the GRSG program by providing equally flexible funds to non-health professional components of universities. This is fitting, because approximately one-fifth of all NIH and NIMH supported research activity is conducted in components of universities other than health professional schools. Conceptually identical to the GRSG program, the BSSG program will provide approximately 116 institutions with awards during 1972. As in the GRSG program, decisions regarding the expenditure of these funds will be made by the recipient institution, thereby providing the grantee with the greatest latitude possible in developing its research program.

Health Sciences Advancement Awards: To date eleven awards have been made. The academic community has been notified that no new applications will be accepted for review. During F.Y. 1972 four institutional advancement programs will continue to be supported with the funds requested, to meet pre-existing commitments.

Distribution of Funds by Program Area in 1972

The following table illustrates the planned 1971 and 1972 distribution of grants within general research support programs. This is a decrease of $5,000,000 from 1971 to 1972 and reflects reallocations from the General Research Support programs to the higher priority new initiative areas funded elsewhere in the NIH budget.

	1971 Estimate		1972 Estimate	
	No.	Amount	No.	Amount
General Research Support Educational Institutions:				
Dentistry	33	$2,041,000	35	$1,958,000
Medical	100	23,275,000	102	21,951,000
Public Health	12	1,520,000	12	1,387,000
Pharmacy	15	695,000	15	612,000
Veterinary Medicine	17	1,476,000	17	1,346,000
Nursing	2	87,000	3	122,000
Noneducational Institutions:				
Hospitals	76	7,729,000	76	7,059,000
Research Institutes and Others	69	6,296,000	71	6,120,000
Health Departments	2	304,000	2	245,000
Subtotal	326	43,423,000	333	40,800,000
Biomedical Sciences Support Grants	112	6,777,000	116	6,400,000
Health Sciences Advancement Awards	9	4,000,000	4	2,000,000
Total	447	54,200,000	453	49,200,000

The following table shows the estimated amounts to be provided by each of the contributing appropriations:

	1971 Estimate	1972 Estimate
National Institutes of Health		
National Cancer Institute	$5,901,000	$5,275,000
National Heart and Lung Institute	8,127,000	7,267,000
National Institute of Dental Research	1,028,000	908,000
National Institute of Arthritis and Metabolic Diseases	8,123,000	7,243,000
National Institute of Neurological Diseases and Stroke	5,027,000	4,481,000
National Institute of Allergy and Infectious Diseases	5,044,000	4,494,000
National Institute of General Medical Sciences	6,978,000	6,218,000
National Institute of Child Health and Human Development	3,909,000	3,475,000
National Eye Institute	1,551,000	1,381,000
National Institute of Environmental Health Sciences	485,000	431,000
Subtotal, NIH	46,173,000	41,173,000
Health Services and Mental Health Administration		
National Institute of Mental Health	8,027,000	8,027,000
Total	54,200,000	49,200,000

Program Purpose and Accomplishments

Activity: General Research Support (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$43,423,000	Indefinite	--	$40,800,000

Purpose: The General Research Support Grant program was started in 1962 after the passage of Public Law 86-798. The NIH established this program to give institutions heavily engaged in health-related research greater control over the quality, content, emphasis and direction of their research activities than was possible exclusively under the research project grant system. Within broad defined guidelines, the General Research Support Grant may be spent for direct costs of health research and research training in any way deemed appropriate by the recipient institution.

Explanation: Viewed as complementary to project grants, this formula-grant provides funds on a continuing basis to eligible institutions for their flexible and discerning use in research and research training activities. The dollar amount of each award is derived by a formula which basically reflects the level of National Institutes of Health and National Institute of Mental Health research project grants received by the institution in the preceding fiscal year. Eligible institutions include schools of medicine, dentistry, osteopathy, public health and other types of health professional schools, hospitals, state and local health departments and nonacademic health research organizations. The fundamental rationale of this program is that effective health research requires a strong institutional base as well as direct project support. Funds provided by the General Research Support Grant program have been used for the support of central and shared research resources for meeting emerging opportunities, to explore new and unorthodox ideas, to permit early support of promising scientists, and to utilize funds flexibly to improve and foster present and long-range institutional scientific excellence.

Accomplishments in 1971: In 1971 General Research Support grants provided support to 326 institutions.

Objectives for 1972: The General Research Support program will provide support to approximately 333 institutions in 1972.

Activity: Biomedical Sciences Support Grants (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$6,777,000	Indefinite	--	$6,400,000

Purpose: The Biomedical Sciences Support program is conceptually identical to the General Research Support Grants program; major decisions related to the use of these grant funds are left to the institutions, giving them great flexibility with a minimum of direction and control from the Federal agency level. This program, however, provides funds to academic institutions other than health professional schools for support of their health related research and research training activities.

Explanation: The Biomedical Sciences Support Grant program provides complementary support to project grants through a formula grant-basis which reflects the level of NIH-NIMH research project grants received by the institution in the preceding year. Grant policies encourage institutions to meet emerging opportunities, to explore new and unorthodox ideas, to permit early support of promising scientists, and to utilize funds flexibly to improve and foster present and long-range institutional scientific excellence.

Accomplishments in 1971: In 1971 Biomedical Sciences Support grants provided support to 112 institutions.

Objectives for 1972: The Biomedical Sciences Support grants program will provide support to approximately 116 institutions in 1972.

NATIONAL INSTITUTES OF HEALTH

General Research Support Grants

Program Purpose and Accomplishments

Activity: Health Sciences Advancement Awards (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$4,000,000	Indefinite	--	$2,000,000

Purpose: This award program is designed to assist academic institutions to strengthen significantly their activities in health sciences by (1) supporting the advancement of new and existing health research and training endeavors where an appropriate institutional base for such advancement exists, and (2) encouraging the development of health science activities in institutions that presently possess considerable strength in related fields of science.

Explanation: Awards are competitive on the basis that applicant institutions must identify and describe a unifying research theme or scientific focus within the specific institutional proposal for which funds are requested. Presently a moratorium is in effect on the acceptance of new applications.

Accomplishments in 1971: In 1971, Health Science Advancement Awards were made to nine institutions.

Objectives for 1972: No new awards are contemplated for 1972. Four institutional advancement programs will continue to be supported with the funds requested to meet pre-existing commitments.

Justifications

Appropriation Estimate

BUILDINGS AND FACILITIES

For construction, major repair, improvement, extension, alteration, and equipment, including acquisition of sites, of facilities of or used by the National Institutes of Health, where not otherwise provided, $3,565,000, to remain available until expended.

Explanation of Language Changes

No additional funds were provided in 1971 and all appropriation language was deleted.

Buildings and Facilities

Amounts Available for Obligation

	1971	1972
Appropriation	$ ---	$3,565,000
Unobligated balance, start of year	14,373,000	7,658,000
Unobligated balance, end of year	-7,658,000	-4,242,000
Total, obligations	6,715,000	6,981,000

Obligations by Activity

Page Ref.		1971 Estimate	1972 Estimate	Increase or Decrease
131	Research facilities	$1,879,000	$5,175,000	+$3,296,000
132	Service and administrative facilities	4,836,000	1,806,000	-3,030,000
Total obligations		6,715,000	6,981,000	+266,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
NATIONAL INSTITUTES OF HEALTH			
Travel and transportation of persons	$ ---	$ 5,000	$ +5,000
Printing and reproduction	45,000	50,000	+5,000
Other services	1,823,000	4,935,000	+3,112,000
Supplies and materials	---	10,000	+10,000
Lands and structures	3,200,000	1,890,000	-1,310,000
Total, National Institutes of Health	5,068,000	6,890,000	+1,822,000
ALLOCATION TO GENERAL SERVICES ADMINISTRATION			
Travel and transportation of persons	$ 2,000	$ ---	$ -2,000
Printing and reproduction	5,000	---	-5,000
Other services	464,000	16,000	-448,000
Lands and structures	1,176,000	75,000	-1,101,000
Total, General Services Administration	1,647,000	91,000	-1,556,000
Total obligations by object	6,715,000	6,981,000	+266,000

Summary of Changes

1971 Budget Authority	$ ---
1972 Budget Authority	3,565,000
Net change	+3,565,000

Program Increases:	Base	Change from Base
1. Research facilities	$ ---	+$2,000,000
2. Service and administrative facilities	---	+1,565,000
Total	---	+3,565,000

Explanation of Changes

1. Research facilities -- The $2,000,000 increase is for the National Environmental Health Sciences Center.

2. Service and administrative facilities -- The $1,565,000 increase represents increases of $1,000,000 for repairs and improvements, $325,000 for an incinerator at the Rocky Mountain Laboratory, and $240,000 for modifications in the NIH heating plant at Bethesda.

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1961	$ 3,135,000	$ 3,135,000	$ 3,470,000	$ 3,470,000
1962	21,745,000	18,230,000	18,230,000	18,230,000
1963	29,761,000	31,000,000	33,200,000	33,200,000
1964	19,072,000	13,811,000	16,311,000	16,311,000
1965	21,512,000	21,512,000	23,012,000	22,512,000
1966	7,781,000	9,431,000	8,977,000	8,977,000
1967	18,279,000	18,279,000	18,279,000	18,279,000
1968	10,715,000	10,715,000	15,075,000	10,715,000
1969	12,495,000	---	5,310,000	---
1970	1,000,000	1,000,000	1,900,000	1,900,000
1971	---	---	---	---
1972	3,565,000			

Note - Prior to 1970, funds include all DHEW health activities. Separate NIH appropriation enacted in 1970.

General Statement

This appropriation includes all proposed direct construction items of the National Institutes of Health and all continuing projects except the Mental Health-Neurology Research Facility, which was appropriated under "Mental Health Activities" and "Neurology and Blindness Activities" in 1961, and the John E. Fogarty International Center for Advanced Study in the Health Sciences, for which planning funds were appropriated in 1968 under "John E. Fogarty International Center for Advanced Study in the Health Sciences".

Research Facilities

National Environmental Health Sciences Center

1972 appropriation estimate	$2,000,000

Funds requested in 1972 of $2,000,000, together with planning funds appropriated in 1961 and 1965, will provide for the design of the first phase of permanent facilities for the National Institute of Environmental Health Sciences at Research Triangle Park, North Carolina.

This phase will provide an estimated 240,000 gross square feet of program space plus site development and supporting utilities. The site development and supporting utilities will be central facilities in support of all users of the site at Research Triangle Park, North Carolina.

The research mission of the National Institute of Environmental Health Sciences is to identify the chemical, physical, and biological factors in the environment that can adversely affect man; to contribute to an understanding of the mechanisms and manifestations of human diseases produced by these agents; and to provide the scientific basis for the development of control measures by other agencies.

Estimated Progress Schedule

Design	
Award	April 1972
Completion	Incrementally April 1973 to April 1974
Construction	
Award	Incrementally July 1973 to July 1974
Completion	Incrementally August 1975 to August 1976

Service and Administrative Facilities

Repairs and Improvements

1972 appropriation estimate	$1,000,000

In 1972, $1,000,000 is requested for repairs and improvements to the existing NIH plant. The NIH plant is quite extensive and many of the buildings and facilities are now approaching 20 or 30 years of service. The need for repairs and improvements is a continuing one. Examples of projects which require financing in 1972 include: installation of additional fire protection equipment in several laboratory buildings; improvements to the electrical system at the Rocky Mountain Laboratory; improvements to the Clinical Center air conditioning system to correct air supply deficiencies; installation of emergency electrical generators for permanent buildings at the NIH Animal Center; repairing cooling towers in the central NIH heating and air conditioning plant; renovation of older laboratory buildings to correct safety hazards; remodel freight elevator in the initial NIH building constructed in 1938; and improvements to cage washing equipment.

Incinerator - Rocky Mountain Laboratory, Hamilton, Montana

1972 appropriation estimate	$325,000

In 1972, $325,000 is requested for the replacement of the incinerator at the Rocky Mountain Laboratory, Hamilton, Montana. The existing incinerator cannot comply with the criteria for air pollution control, nor can it be modified to do so within practical limitations. In addition, its capacity is inadequate to handle the refuse load currently being generated. Municipal resources cannot be employed due to potentially hazardous waste.

The structural condition of the existing incinerator, its lack of control equipment, and its general antiquated design dictate a complete replacement rather than a modernization of the existing facility. The limited capacity of the existing equipment has made it necessary to resort occasionally to open burning, a practice that must be eliminated.

Estimated Progress Schedule

Design	
Award	April 1972
Completion	February 1973
Construction	
Award	June 1973
Completion	June 1975

Modification to NIH Heating Plant, Bethesda, Maryland

1972 appropriation estimate	$240,000

In 1972, $240,000 is requested for the conversion of the NIH heating plant to dual firing (capable of using either natural gas or oil), to ensure compliance with the recently enacted Maryland Air Pollution Control Code. If the Washington Gas Light Company is unable to supply the estimated NIH requirement of natural gas, these funds will be used to equip the boilers with air pollution control equipment required to comply with applicable air pollution abatement criteria.

Justifications

National Institutes of Health Management Fund

Amounts Available for Obligation

	1971	1972
Advances and Reimbursements from:		
Formula advances -- NIH appropriation	$52,161,000	$55,105,000
NIMH appropriation	5,623,000	5,623,000
Non-formula receipts and outside reimbursements	1,199,000	1,199,000
Total	58,983,000	61,927,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
	Reimbursable obligations:						
177	Computer Services	102	$4,464,000	102	$4,625,000	--	$+161,000
179	Research Services	299	5,251,000	299	5,497,000	--	+246,000
180	Engineering Services	563	11,715,000	563	12,300,000	--	+585,000
181	Clinical Services	1,485	20,941,000	1,500	21,831,000	15	+890,000
182	Administrative Services	656	8,254,000	656	8,957,000	--	+703,000
183	Grant Review & Approval	444	8,358,000	444	8,717,000	--	+359,000
	Total obligations	3,549	58,983,000	3,564	61,927,000	15	+2,944,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions....................	3,549	3,564	+15
Full-time equivalent of all other positions..............	138	138	—
Average number of all employees.	3,551	3,578	+27
Personnel compensation:			
Permanent positions..........	34,496,000	36,768,000	+2,272,000
Positions other than permanent..................	1,190,000	1,223,000	+33,000
Other personnel compensation..	2,141,000	2,261,000	+120,000
Subtotal, personnel compensation.............	37,827,000	40,252,000	+2,425,000
Personnel benefits.............	3,403,000	3,606,000	+203,000
Travel & transportation of persons.....................	440,000	445,000	+5,000
Transportation of things........	75,000	75,000	—
Rent, communications & utilities	3,778,000	3,850,000	+72,000
Printing and reproduction.......	432,000	432,000	--
Other services:			
Project contracts............	250,000	500,000	+250,000
Other.......................	6,193,000	6,058,000	-135,000
Supplies and materials..........	4,925,000	5,191,000	+266,000
Equipment.......................	1,699,000	1,557,000	-142,000
Insurance claims and indeminities.................	1,000	1,000	—
Quarters and subsistence charges.....................	-40,000	-40,000	--
Total obligations by object...................	58,983,000	61,927,000	+2,944,000

Summary of Changes

1971 estimated obligations	$58,983,000
1972 estimated obligations	61,927,000
Net change	+2,944,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	---	---	---	1,654,000
2. Wage board increase	---	---	---	97,000
3. Within-grade pay increase	---	---	---	501,000
4. Extra day of pay	---	---	---	147,000
5. FTS rate increase	---	---	---	45,000
B. Program:				
1. Computer services	102	4,464,000	---	57,000
2. Research services	299	5,251,000	---	47,000
3. Engineering services	563	11,715,000	---	114,000
4. Clinical services	1,485	20,941,000	15	238,000
5. Administrative services	656	8,254,000	---	44,000
Total, increases	---	---	15	2,944,000

Explanation of Changes

Built-in Increases -- The increases will provide: $1,654,000 for annualization of 1971 pay increase cost; $97,000 for wage board increases; $501,000 for within-grade pay increases; $147,000 for extra day of pay in 1972 and $45,000 for Federal Telecommunications System rate increase.

Computer Services -- The program increase of $57,000 will enable the Division to explore areas of computer application in the Clinical Center.

Research Services -- The program increase of $47,000 will provide support for expansion of the Animal Disease Investigation service and the NIH Library's inter-library loan service.

Engineering Services -- The program increase of $114,000 will provide for increased utility services.

Clinical Services -- The program increase of $238,000 will provide $72,000 for ten nursing positions to initiate the clinical services required for a "new born" nursery to be established July 1, 1971 by the National Institute of Child Health and Human Development; $44,000 for five nursing positions to strengthen other clinical nursing services; and $122,000 to partially meet increasing Clinical Center drug requirements.

Administrative Services -- The program increase of $44,000 will provide for support in new initiative areas.

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	3,549	$41,190,000	3,564	$43,818,000	+15	$+2,628,000
Other expenses.........	---	17,793,000	---	18,109,000	---	+316,000
Total..............	3,549	58,983,000	3,564	61,927,000	+15	+2,944,000

General Statement

The NIH Management Fund provides for services furnished centrally for all of the Bureaus, Institutes and Research Divisions located at NIH. The Management Fund is made up of the following organizations: the Division of Computer Research and Technology, the Division of Research Services, the Office of Engineering Services, the Clinical Center, the Office of Administrative Services, and the Division of Research Grants.

Computer Services

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	102	$1,776,000	102	$1,937,000	---	$+161,000
Other expenses.........	---	2,688,000	---	2,688,000	---	---
Total..............	102	4,464,000	102	4,625,000	---	+161,000

General Statement

The Division of Computer Research and Technology is a central scientific and computational resource for the NIH programs. The Division plans and conducts an extensive interdisciplinary research and development program in which the concepts and methods of computer science, engineering and mathematics are applied to biomedical problems. These research efforts provide a broad technical foundation for computational efforts at NIH and application of health knowledge.

Program Plans in 1971 and 1972

In 1970 the Division continued to expand the effective power of the central NIH computer facilities through the use of remote terminals. One primary DCRT objective during the remainder of 1971 and 1972 is to further efficient use of remote computing. This concept is possible because the Division has a stable and highly effective central system. It includes four large computers integrated into one system by sharing a common library of computer programs. This concept provides for a highly flexible computing utility for the diversified NIH user.

Past uses of the computational ability available have primarily been in areas of pure science and the managerial conduct of the categorical programs. It is the goal of the Division during the 1970's to widen the use of computers by examining the areas of applied science and management. The remote computing concept is ideally suited for the areas of medical telecommunications systems, patient care systems and management information storage, retrieval, and analysis.

Work is underway by Division personnel on an effective medical telecommunications system. One important potential outcome from this is rapid and convenient access for the practicing physician as well as the research scientist to computer-based medical information. The method presently being studied most intensively involves the use of a "touch-tone" telephone acting both as an entry (through the use of tone coding on the keys) and reporting device (through audible voice simulation response).

During 1972, the Division intends to explore areas of possible computer application in the Clinical Center. The use of computers in the general area of patient care has potential benefits in manpower savings and accessibility of information to the clinician and nurse. Present areas of interest are the automation of information processing for supportive services such as patient records and the study of problems involved in direct patient care and surveillance.

A computerized system to record doctor's orders has been developed using the NIH Computer Division text-editing system, WYLBUR. Using an IBM 2741 typewriter computer terminal, a nurse records and updates all on-going orders on a WYLBUR data set. Several computer programs run by the nurse at the terminal read this data set and generate the nursing cardex (a list of all existing orders for each patient) and medication lists on which the nurses record the drugs administered to patients. This system is presently undergoing evaluation by personnel of the National Institute of Arthritis and Metabolic Diseases.

Eventual expansion of this system is planned to include the computer recording of actual drug administration via touch-tone telephone at the patient's bedside. Such a system will have invaluable use in 1) reductions in patient medication errors, 2) studies of drug efficiacy and toxicity, and 3) studies of drug interaction and incompatibilities.

A computer system is to be implemented to support the needs of the Clinical Center and the NHLI by automating a coronary case unit and the existing surgical recovery room.

Functionally, this system will provide for the monitoring of vital signs of acutely ill patients from between four to eight beds which are to be distributed among two separate special care areas in the Clinical Center. The collected data will be analyzed to provide the clinician with all parameters that he desires to aid in his management of the patient. Summaries of historical data are available for trend analysis and other statistical studies.

The sophisticated monitoring techniques to be incorporated within this system will allow the clinical investigator to gain greater insight into the time course of events associated with the pathophysiology of the cardiovascular system.

Management uses of the computer are at present relatively unsophisticated. The terminal concept could do for the NIH manager what medical telecommunications is attempting to do for the physician; i.e., provide him with easy access to computer based information. It will be the goal of this Division in 1971 and 1972 to explore areas of application of ADP in management at NIH.

The Division is requesting an increase of $161,000. This includes a program increase of $57,000, $98,000 for annualization of 1971 pay increase; $4,000 for extra day of pay in 1972; and $2,000 for increased costs in 1972 for using the Federal Telecommunications System.

Research Services

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	299	$3,819,000	299	$4,063,000	---	$+244,000
Other expenses.........	---	1,432,000	---	1,434,000	---	+2,000
Total.............	299	5,251,000	299	5,497,000	---	+246,000

General Statement

The Division of Research Resources provides scientific, technical, and engineering services to support and further the research programs at the National Institutes of Health.

The programs of the Division which are in direct support of research include the design, development, and fabrication of instruments and materials; biomedical engineering of methods and systems; production of bacteriologic and tissue culture media; preparation of sterile glassware; production of genetically defined rodents and rabbits; quarantine and conditioning of dogs, cats, and primates; maintenance of farm animals, animal surgery, and recovery; animal health services; still and motion picture photography, graphic arts services, and exhibits design; medical illustration and model making; library services; and foreign language translation. In addition, the Division provides environmental engineering services designed to maintain and improve the health of Clinical Center patients and NIH employees.

The Division of Research Services will continue to provide direct support to the intramural research staff of professional and scientific personnel within the various Institutes and Divisions in the NIH community. Special emphasis will be placed on the expansion and improvements of the Animal Disease Investigation service, the Library's interlibrary loan service, and the biohazard control program.

The increase of $246,000 will provide $129,000 for the annualization of the 1971 pay increase; $54,000 for within-grade pay increases; $14,000 for one day extra pay; $47,000 for changes in Laboratory and Clinical programs; and $2,000 for increased cost of the Federal Telecommunications System.

Engineering Services

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	563	$6,743,000	563	$7,214,000	---	$+471,000
Other expenses.........	---	4,972,000	---	5,086,000	---	+114,000
Total.............	563	11,715,000	563	12,300,000	---	+585,000

General Statement

The Office of Engineering Services provides engineering, architectural, craft and labor services required for the: (1) operation and maintenance of the National Institutes of Health facility; (2) planning of facilities and improvements; (3) administration and inspection of construction performed under direct contract; and (4) liaison and inspection of projects administered by both the Facilities Engineering and Construction Agency, DHEW, and the Public Buildings Service of the GSA.

Program Plans in 1971 and 1972

In 1971 and 1972, the Office of Engineering Services will continue to provide services to operate and maintain the buildings and grounds on the 300-acre Bethesda reservation and the 500-acre NIH Animal Center, Poolesville, Maryland. In addition, assistance will continue to be rendered for NIH activities located in Sabana Seca, Puerto Rico; San Francisco, California; Hamilton, Montana; the Panama Canal Zone; and the Research Triangle Park, North Carolina.

During 1971, the design is scheduled to be completed for the following projects: Phase II of the NIH Animal Center, Poolesville; the Multilevel Parking Facilities for the General Office Building, Bethesda; the Child Health and Human Development Research Facility, Bethesda; the Dental Health Center Addition, San Francisco; the Fogarty International Center for Advanced Study in the Health Sciences, Bethesda; and the Master Plan for the National Institute of Environmental Health Sciences at Research Triangle, North Carolina. Design contracts are also scheduled for award in 1971 for the Lister Hill National Center for Biomedical Communications, Bethesda, and for the Child Health Addition to Building 10, Bethesda.

Construction of Phase IA of the NIH Animal Center, Poolesville, Maryland and the Multilevel Parking Facility for the Cancer, Mental Health-Neurology Buildings Complex will be completed during 1971. Construction contracts are scheduled for award in 1971 for the Sewage Treatment Plant at the NIH Animal Center, Poolesville, Maryland, and the NIH Tri-Service Incinerator Facility, Forest Glen, Maryland.

1972 program plans include the planning of a viable first stage in the construction of permanent facilities for the National Institute of Environmental Health Sciences at the Research Triangle, North Carolina; award of the construction contract for the Dental Health Center Addition, San Francisco, California; and continuation of the program of major repairs and improvements to existing NIH facilities.

In both 1971 and 1972, preliminary planning will continue on a number of projects for which additional funds will be required in future years.

The increase of $585,000 will provide $114,000 for utility service cost increases; $368,000 for annualization of the 1971 pay increase costs; $72,000 for within-grade pay increases; $30,000 for extra day of pay in 1972; and $1,000 for Federal Telecommunications System.

Clinical Services

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	1,485	$16,260,000	1,500	$17,028,000	+15	$+768,000
Other expenses.........	---	4,681,000	---	4,803,000	---	+122,000
Total.............	1,485	20,941,000	1,500	21,831,000	+15	+890,000

General Statement

The Clinical Center is the research facility supporting the clinical investigation activities of eight institutes of the National Institutes of

Health. It also supports the clinical investigation program of the National Institute of Mental Health. Its mission is to provide optimum services for: (1) research support to the Institutes; (2) patient care; and (3) developing procedures and techniques for improving patient care services. These supporting services include nursing, clinical pathology, blood bank, anesthesiology, diagnostic radiology, pharmacy, physical and occupational therapy, nuclear medicine, patient nutrition, medical records, social work, spiritual ministry, environmental sanitation control, laundry and numerous administrative services.

Administrative Services

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	656	$6,402,000	656	$7,060,000	---	$+658,000
Other expenses.........	---	1,852,000	---	1,897,000	---	+45,000
Total.............	656	8,254,000	656	8,957,000	---	+703,000

General Statement

The Office of Administrative Services provides technical and administrative services in the fields of protection and safety management, printing and reproduction, procurement, communications, traffic and parking control, supply management, space management, transportation, property management, domestic and foreign travel, real property management, and housekeeping services. Coordination and liaison with the Department and other Agencies regarding the interpretation of statutory regulations, implementation procedures, and establishment of policy guidelines for the NIH with respect to the above services are also the responsibility of the Office of Administrative Services.

Program Plans for 1971 and 1972

Program plans during 1971 and 1972 taking into account economy in operations and maximum utilization of staff, will emphasize the continuation of effective and economic services. There are continuing increases in workloads in all areas which must be met by improved methods and increased efficiency within current staffing limits. There will be added emphasis on automation in an effort to capitalize upon the merits of computer oriented management approach. Implementation of the program to provide special police authority and the administration and operation of the multi-level parking facilities will present additional enforcement problems. To provide greater security and efficiency with the limited guard personnel, a study has been made on the installation of closed circuit TV in specific buildings and the increased utilization of electronically controlled doors was effected in designated buildings. In excess of 2,000,000 square feet of space in 43 buildings will be maintained and cleaned. The volume of mail continues to increase and the number of pieces processed will be in excess of the 20,000,000 processed in 1970. Plans are being considered to establish centralized supply ordering and receiving points within designated buildings. It is intended to expand inspections of complex electronic equipment and identify unrequired Government property of research grantees for utilization by the Government or other grantees.

The increase of $703,000 requested in 1972 consists of $659,000 in mandatory items and a program increase of $44,000. The mandatory increases of $659,000 consist of within-grade pay increases, an extra day of pay, annualization of the 1971 pay increase costs, wage board increases, and the Federal Telecommunications System rate increase. The program increase of $44,000 is to provide central service support for greatly expanded programs in cancer and heart and lung research.

Grant Review and Approval

	1971 Estimate		1972 Estimate		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits.........	444	$6,190,000	444	$6,516,000	---	$+326,000
Other expenses.........	---	2,168,000	---	2,201,000	---	+33,000
Total.............	444	8,358,000	444	8,717,000	---	+359,000

General Statement

The Division of Research Grants is responsible for initiating and developing recommendations and providing staff support in formulating PHS grant and award policies and procedures relating to research, center, and training grants. It represents the NIH in the assignment of research grant applications among the Bureaus of the Public Health Service and within the National Institutes of Health to initial review groups and Institutes and Divisions. Through study sections and other review groups, it provides for the scientific review of applications for NIH grant and award support. It collects and analyzes program data needed by the NIH in the management of its extramural programs and reviews and evaluates the character and direction of biomedical research and training supported by the NIH and the resources involved in providing such support.

Program Plans for 1971 and 1972

In addition to its responsibilities for the scientific review and evaluation of applications for the support of research, training grants, and other awards, the Division in 1971 and 1972 will continue its emphasis on:

(1) The identification and assessment of research trends in areas of biomedical research. This will entail the collection and analysis of data related to research accomplishments, current scientific activity, and research support. Exploratory studies will also be carried out to correlate and/or evaluate the status of biomedical research and training with the allocation of resources.

(2) The further development of a computer based information and retrieval system to provide management with more complete statistical information on extramural grant and training programs, including detailed indexing of the scientific content of research projects.

The increase of $359,000 will provide $179,000 for annualization of the 1971 pay increase; $125,000 for within-grade pay increases; $22,000 for extra day of pay in 1972; and $33,000 for increased costs in 1972 of using the Federal Telecommunications System.

Program Purpose and Accomplishments

Activity: Computer Services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
102	$4,464,000	---	102	$4,625,000

Purpose: The DCRT is a central scientific and computational resource for the NIH programs. Through its own research and development programs, it provides a solid technical background, both in facilities and in new research "tools", for use in the areas of biomedical research, education, and the application of health knowledge.

Explanation: The Division conducts research in areas of computer science, engineering, and mathematics as these disciplines relate to biomedicine. The Division also collaborates with other NIH programs on research of mutual interest.

Accomplishments: During 1971 the Division has continued the expansion of remote computing in all areas of NIH. Remote terminals are now being used in managerial offices as well as in laboratories. The Division has also assisted in the development and installation of systems designed to link laboratory equipment with the central computers for the purpose of analyzing data.

Objectives: During 1972 the Division intends to continue developmental work on a medical telecommunications system designed to give the practicing physician convenient access to computer based medical information. Also in 1972 the Division intends to explore areas of possible computer application in the Clinical Center. The use of the computer in areas of patient care, medical records and drug administration have great potential benefits in manpower savings and accessibility of information to the clinician and nurse.

Activity: Research Services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
299	$5,251,000	---	299	$5,497,000

Purpose: The Division of Research Services provides scientific, technical, and engineering services to support and further the research programs at the National Institutes of Health.

Explanation: The Division provides services for the conduct of research activities by providing essential items such as laboratory animals, culture media and glassware; the design and fabrication of laboratory instrumentation; the operating of the National Institutes of Health medical reference library including the translation of medical literature; scientific photography and medical arts; and environmental engineering services.

Accomplishments in 1971: The Division initiated an Animal Disease Investigation service to improve the health and well-being of research animals throughout the National Institutes of Health by responding to calls when disease problems arise. A Biomedical Engineering and Instrumentation Satellite Shop was established to make skills and facilities for fabrication, maintenance, and repair of scientific equipment immediately available for the expanded components of NCI, NINDS, NICHD, and NIMH located in Buildings 36 and 37. A color-sound film produced in the Medical Arts and Photography Branch for the National Heart and Lung Institute has won several awards and international acclaim. This is an outstanding achievement due to the highly technical requirements in filming productions for scientific research. Contracts have been awarded to commercial suppliers for specific selected strains of rodents. This method of procuring animals will hopefully offset personnel reductions and re-establish more effective sanitation and workload levels. The Division's Workload Reporting System was re-examined and a revised system implemented to identify important trends on a timely basis and to encourage more accurate planning.

Objectives for 1972: The Division will expand and improve the Animal Disease Investigation service for the health surveillance of animals being used in I/D programs. Among other benefits, improved animal surveillance will protect the health of persons in contact with research animals and will protect the investment of research funds. Emphasis will be placed on the Library's interlibrary loan service which makes available to the NIH scientist required literature not obtainable in the Library's collection. The wide subject scope of NIH research programs demands a continuing responsiveness to the scientific investigators. The Division feels a strong need for a biohazard control program. The increase in the number of "hot labs", the emphasis on biohazards containment, and the real danger inherent in further delay dictates immediate action to the well-being of the National Institutes of Health.

Activity: Engineering Services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
563	$11,715,000	---	563	$12,300,000

Purpose: The Office of Engineering Services provides engineering, architectural, craft, and labor services required for: (1) operation and maintenance of National Institutes of Health facilities; (2) planning of facilities and improvements; (3) administration and inspection of construction performed under direct contract; and (4) liaison and inspection of direct construction projects administered by either the Public Buildings Service, GSA, or the Facilities Engineering and Construction Agency, DHEW.

Explanation: The facilities of the National Institutes of Health are composed of the main reservation at Bethesda consisting of 306 acres with approximately 41 buildings providing over 4,666,200 gross square feet of space and the NIH Animal Center near Poolesville consisting of 513 acres with completed facilities providing 132,300 gross square feet of space. In addition, maintenance support is provided to NIH field stations.

Accomplishments in 1971: In 1971 services were provided to operate and maintain the buildings and grounds at both Bethesda and the NIH Animal Center. Maintenance support was also provided to NIH field stations.

During 1971, the design is scheduled to be completed for the following new facilities: Phase II of the NIH Animal Center, Poolesville; the Multilevel Parking Facilities for the General Office Building, Bethesda; the Child Health and Human Development Research Facility, Bethesda; the Dental Health Center Addition, San Francisco; the Fogarty International Center for Advanced Study in the Health Sciences, Bethesda; and the Master Plan for the National Institute of Environmental Health Sciences at Research Triangle, North Carolina. Design contracts are also scheduled for award in 1971 for the Lister Hill National Center for Biomedical Communications, Bethesda, and the Child Health Reproductive and Perinatal Biology Facility.

Construction of Phase IA of the NIH Animal Center, Poolesville, and the Multilevel Parking Facility for the Cancer, Mental Health-Neurology Buildings Complex will be completed during 1971. Construction contracts are scheduled for award in 1971 for the Sewage Treatment Plant at the NIH Animal Center, Poolesville, and the NIH Tri-Service Incinerator Facility, Forest Glen, Maryland.

Objectives for 1972: The program for fiscal year 1972 includes the continued operation and maintenance of the NIH physical plant including services to be provided new facilities scheduled for completion in 1971 and repair and improvements of existing buildings and grounds.

1972 objectives further include the continuation of design contracts awarded in 1971 and the planning of a viable first stage in the construction of permanent facilities for the National Institute of Environmental Health Sciences at the Research Triangle, North Carolina. Construction will be continued on those projects scheduled for award during the latter part of 1971 together with the continuation of the program of major repairs and improvements to existing NIH facilities..

Other objectives in 1972 encompass the preliminary planning on a number of construction projects for which additional funds will be required in future years.

Activity: Clinical Services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
1,485	$20,941,000	---	1,500	$21,831,000

Purpose: The Clinical Services provides facilities and services, other than physician care, for: (1) an integrated operation of its patient facilities servicing nine Institutes conducting clinical investigations; (2) developing and recommending policies and rules for the protection and welfare of patients; (3) conducting research in methods and techniques of hospital administration in a medical research environment; and (4) numerous other medical care services.

Accomplishments in 1971: In 1971, complete clinical services will be provided for an estimated 122,000 inpatient days and for 50,000 outpatient visits in support of the clinical research projects of the nine Institutes.

Objectives for 1972: In 1972, a continued emphasis will be made to provide maximum patient care and support of the medical research investigations of the various Institutes.

Activity: Administrative Services

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
656	$8,254,000	---	656	$8,957,000

Purpose: This activity provides a variety of central services to the Bureaus, Institutes and Divisions of the National Institutes of Health.

Explanation: The Office of Administrative Services provides the NIH with plant and office services, including cleaning of space; mail, messenger, telephone and other communication services; operation and maintenance of motor vehicles; guards, fire fighting, and other plant protection and safety services; and procurement and supply management services.

Accomplishments in 1971: The increasing workloads were handled without any increase in staff. Additional space was cleaned and maintained, the volume of mail processed was increased, and the number of procurement line items were increased.

Objectives for 1972: We will continue to provide central service support to the Bureaus, Institutes, and Divisions of NIH. It is estimated that the workloads will continue to increase as in past years, and attempts will be made to cope with the increased workloads by utilizing the most efficient management and manpower techniques.

Activity: Grant Review and Approval

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
444	$8,358,000	---	444	$8,717,000

Purpose: To provide for the initial scientific and technical review of applications and collect, store, retrieve, and analyze management and program data for the NIH extramural program.

Explanation: The National Institutes of Health Management Fund is authorized to fund central service type functions such as those performed by the Division of Research Grants.

Accomplishments in 1971: Approximately 37,000 applications for research grants and training awards were processed in the Division of Research Grants. A large majority of these applications were evaluated for scientific merit by the various study sections of the Division. A number of scientific conferences and workshops were sponsored by the study sections or in cooperation with the research Institutes/ Divisions of the NIH for the evaluation of the status of and/or the need for further emphasis in various fields of scientific endeavors such as orthopedic research, computer research, sickle cell anemia, calcium transfer, nutritional anemias, prolactin, and boundary effects on moving blood.

A comprehensive data system was developed to integrate information on scientific content of research grants with administrative and fiscal data.

Objectives for 1972: To continue through the study sections the review for scientific merit of applications for NIH support for research grant and research career awards. Also to continue the sponsorship of scientific conferences and workshops for the evaluation of the status of or the need for further emphasis in various fields of scientific endeavor. Anticipated conferences include (1) Interaction of steroid hormones with target tissues, (2) Venous thrombosis, (3) Significance of Crithidia Fasciculata as a research model, and (4) Information sciences as related to the problems associated with scientific communication.

Studies are in progress and reports will be prepared on NIH support of research related to selected diseases of the first five years of life. Also, a pre-coordinated information retrieval system for reporting on all biomedical research that NIH supports by the traditional research project grant will be continuously expanded and updated.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Clinical Services			
Nurse	GS-7	10	$86,380
Nurse	GS-5	3	24,876
Nursing Assistant	GS-4	2	11,706
Total new positions, all activities....		15	122,962

OFFICE OF THE DIRECTOR

STATEMENT OF DR. JOHN F. SHERMAN, DEPUTY DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Senator MAGNUSON. I have one or two questions on the Office of the Director request. We have seen a lot of health areas where responsibility is distributed between several Institutes. This seems to be getting even more prevalent. Are you increasing your coordination staff to assure that there is no duplication of effort? Could you use more people in this effort?

Dr. SHERMAN. It is very true that the responsibilities for much health research are distributed among several Institutes as it involves the several scientific disciplines. The Director has met this problem of coordination by the appointment of task forces of which those on genetics, sickle cell anemia, and hepatitis are the most well-known examples.

We have not been able to increase our staff for this purpose due to employment restrictions in recent years. On the other hand there is an ever-present need for additional people in the area of coordination. At the present time our task force members must perform these special duties in addition to their normal full-time responsibilities.

Senator MAGNUSON. Will your office be strengthened in any way to deal with the expended cancer initiative?

Dr. SHERMAN. Given the importance and the magnitude of the expanded cancer initiative and in spite of the remaining uncertainties as to details, it is imperative that the Office of the Director, NIH, be strengthened so as to assure fulfillment of its responsibilities for coordination. It is particularly important that in both programmatic and managerial areas additional personnel be obtained for the Office of the Director so that both the cancer effort and research in the remainder of the NIH are given prompt and appropriate assistance.

Senator MAGNUSON. Why are contract management functions being shifted into your office? How much are you budgeting for this?

Dr. SHERMAN. The inclusion of estimated requirements for contract management in this appropriation represents a consolidation in one organization of activities hitherto distributed in several parts of the Office of the Director, some of which were financed from the NIH management fund and some from the Office of the Director appropriation. Since the new organization supports the Director in carrying out his overall management responsibilities, we considered it appropriate to include the total function in this appropriation. We emphasize that this does not involve centralization of activities but rather a consolidation of several activities already operated at the central level. Our budget request for these contract management functions is $1,742,000.

Senator MAGNUSON. Well, thank you Doctor.

NATIONAL INSTITUTES OF HEALTH

SCIENTIFIC ACTIVITIES OVERSEAS (SPECIAL FOREIGN CURRENCY PROGRAM)

Justifications

Appropriation Estimate

SCIENTIFIC ACTIVITIES OVERSEAS (SPECIAL FOREIGN CURRENCY PROGRAM)

For payments in foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States, for necessary expenses for conducting scientific activities overseas, as authorized by law, [$32,444,000] *$25,545,000,* to remain available until expended: *Provided,* That this appropriation shall be available, in addition to other appropriations for such activities, for payments in the foregoing currencies.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Scientific Activities Overseas (Special Foreign Currency Program)

Amounts Available for Obligation

	1971	1972
Appropriation	$32,444,000	$25,545,000
Real transfer to:		
"Environmental Protection Agency"	-3,500,000	---
Subtotal, budget authority	28,944,000	25,545,000
Unobligated balance, start of year	291,000	---
Total, obligations	29,235,000	25,545,000

Obligations by Activity

Page Ref.		1971 Estimate	1972 Estimate	Increase or Decrease
200	Foreign health research	$29,235,000	$25,545,000	$-3,690,000

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Travel and transportation of persons	$ 65,000	$ 65,000	---
Other services:			
Project contracts	28,645,000	24,964,000	-3,681,000
Grants, subsidies and contributions	525,000	516,000	-9,000
Total obligations by object	29,235,000	25,545,000	-3,690,000

Summary of Changes

1971 estimated obligations		$29,235,000
1972 estimated obligations		25,545,000
Net change		-3,690,000
Program Increases:	Base	Change from Base
1. Disease Control	$1,600,000	$+1,023,000
2. Food and Drug Administration	2,026,000	+3,116,000
Total Increases	$3,626,000	$+4,139,000
Program Decreases:		
1. National Institutes of Health	$10,440,000	-1,650,000
2. Health Services and Mental Health Administration	15,161,000	-6,177,000
3. Office of International Health	8,000	-2,000
Total Decreases	$25,609,000	-7,829,000
Total, net change	---	-3,690,000

Explanation of Changes

The net decrease of $3,690,000 represents a leveling off of research support in certain program areas following the funding, in fiscal year 1971, of a backlog of approved research projects which could not be funded in 1970 due to a severely constrained budget.

Program Increases:

1. Disease Control -- The increase of $1,023,000 for a total program level of $2,623,000 will permit increased support for studies of occupational environment and illness, the health effects of radiation on man, and studies aimed at improving community environmental management.

2. Food and Drug Administration -- The requested program increase of $3,116,000 will permit the FDA to increase by $2,014,000 its research on the safety and efficacy of drugs for a total program level of $3,050,000; and increase by $1,102,000 its support of research to solve food-related health problems for a total program level of $2,092,000.

Program Decreases:

1. National Institutes of Health -- The program decrease of $1,650,000 reflects adjustments in the level of support for research in specific program areas. The requested program level will provide an increase of $287,000 for

population research for a total program level of $1,152,000 and an increase of $684,000 for manpower studies for a total program level of $889,000. The level of support for nutrition studies will be decreased by $29,000 to a program level of $571,000 and the programs of biomedical research and communications will be decreased by $2,592,000 to a total program level of $6,178,000.

2. Health Services and Mental Health Administration -- The requested program level of $8,984,000, a decrease of $6,177,000, will provide $1,075,000 for population and family planning studies, a decrease of $475,000; a decrease of $160,000 for manpower development to a total program level of $365,000; and, a decrease of $155,000 for nutrition studies to a program level of $395,000. Support for research aimed at improving the organization and delivery of health services and disease prevention and control will be reduced by $5,387,000 to a total program level of $7,149,000.

3. Office of International Health -- The decrease of $2,000 represents a decrease in the funds required for travel to provide program leadership.

Authorizing Legislation

Section 104(b) of the Agricultural Trade Development and Assistance Act of 1954, as amended. (Public Law 83-480)

"To collect, collate, translate, abstract, and disseminate scientific and technological information and to conduct research and support scientific activities overseas including programs and projects of scientific cooperation between the United States and other countries such as coordinated research against diseases common to all of mankind or unique to individual regions of the globe, and to promote and support programs of medical and scientific research, cultural and educational development, health, nutrition, and sanitation: Provided, That foreign currencies shall be available for the purposes of this subsection (in addition to funds otherwise made available for such purposes) only in such amounts as may be specified from time to time in appropriation Acts;"

International Health Research Act of 1960
Public Law 86-610, Section 308

"To carry out the purposes of clause (1) of section 2 of the International Health Research Act of 1960, the Surgeon General may, in the exercise of his authority under this Act and other provisions of law to conduct and support health research and research training, make such use of health research and research training resources in participating foreign countries as he may deem necessary and desirable."

Explanation of Transfers

	1971 Estimate	Purpose
Real transfer to:		
Environmental Protection Agency	$-3,500,000	Transfer of some activities to the Environmental Protection Agency pursuant to Reorganization Plan No. 3 in December, 1970. This transfer was part of a complete reorganization of the Environmental Health Service.

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$10,084,000	$8,000,000	$10,084,000	$9,000,000
1963	2,800,000	2,800,000	2,800,000	2,800,000
1964	6,647,000	4,000,000	4,000,000	4,000,000
1965	1,000,000	1,000,000	1,000,000	1,000,000
1966	6,000,000	6,000,000	5,000,000	5,000,000
1967	19,217,000	19,217,000	10,000,000	10,000,000
1968	18,685,000	15,000,000	15,000,000	15,000,000
1969	30,000,000	15,000,000	15,000,000	15,000,000
1970	3,455,000	3,455,000	3,455,000	3,455,000
1971	32,444,000	32,444,000	32,444,000	32,444,000
1972	25,545,000			

General Statement

The Scientific Activities Overseas (Special Foreign Currency Program) is carried out under the authority of Section 104(b) of the Agricultural Trade Development and Assistance Act of 1954, as amended (Public Law 480). Activities under the Program are supported entirely by foreign currencies owned by the United States abroad which have been determined by the Department of the Treasury to be in more than sufficient supply to finance normal U.S. needs in certain countries for two years or more.

An appropriation was first received for the Scientific Activities Overseas Program in 1961. At that time the National Institutes of Health was the only health agency participating in the program. Today, each of the health agencies -- National Institutes of Health, Health Services and Mental Health Administration, Food and Drug Administration, and Disease Control (environmental health operating units remaining with the Department) -- is actively involved in the development and implementation of research and research-related activities under the Program. For these organizations the Special Foreign Currency Program has become a very valuable complementary resource for providing research answers to critical questions which must be answered to achieve their domestic health objectives. Reflecting the priority health interests of the health agencies, emphasis has been placed on seeking solutions to problems in the areas of population and family planning, organization and delivery of health services, nutrition, manpower development, environmental health, and consumer protection. Estimated new obligations in fiscal years 1971 and 1972 in support of projects in these priority areas are as follows:

Estimated New Support for Priority Health Areas

	1971 Estimate	1972 Estimate
Population and Family Planning	$2,415,000	$2,227,000
Organization and Delivery of Health Services	9,536,000	5,295,000
Nutrition	1,150,000	966,000
Manpower Development	730,000	1,254,000
Environmental Health	1,600,000	2,623,000
Consumer Protection	2,026,000	5,142,000

The Program is based on collaboration and mutual benefit between the United States and participating countries. A formal review of each project for scientific merit and conformance with national policies and priorities both in the United States and in the host country insures the collaborative nature of the project. To further insure this collaboration as well as the potential success of the research, a U.S. researcher from either the sponsoring health agency or a U.S. academic or research institution is designated as a U.S. Project Officer to work with the foreign researcher, who is designated as the Principal Investigator.

A conscientious effort is made to utilize unique resources in the participating countries. Such resources include the existence of unique population groups, a high incidence of a particular disease of interest to the health agencies, special epidemiological or ecological conditions not found in the United States, and special talents of the foreign scientific investigators and health workers. The Special Foreign Currency Program has enabled the health agencies to take advantage of these resources and thus undertake new research initiatives that might not otherwise have been possible. Frequently, the cost of carrying out the research abroad is substantially lower than it would have been in the United States.

In addition to admirably serving the purpose of utilizing resources in "excess currency" countries to solve American health problems, this Program also renders an important service to other U.S. foreign policy objectives. The Program has strengthened ties with the scientific community in other countries. An unanticipated benefit of the Program, with promise of future intangible benefits, is becoming more and more apparent. Many young people from "excess currency" countries, who have received advanced research training in the United States or have worked on projects supported under the Program, have maintained an active collaboration with their scientific colleagues in the United States and thus become an extension of the U.S. research community.

The Program also serves humanitarian objectives by sharing with participating nations health science findings which will benefit their people as well as people throughout the world. Through the years, the United States has made a substantial investment in assisting lesser-developed countries in their fight against such diseases as cholera, schistosomiasis, malaria, filariasis, and tuberculosis. The Special Foreign Currency Program serves as an important additional resource in this effort by supporting research to prevent and control these diseases.

There follows a discussion of the goals, objectives and specific project plans of the respective health agencies.

A table of estimated obligations by country follows:

	1971 Estimate	1972 Estimate
Guinea	---	50,000
India	6,045,078	6,203,762
Israel	2,091,000	64,000
Morocco	1,075,000	415,000
Pakistan	2,728,417	1,759,738
Poland	4,993,420	7,395,555
Tunisia	1,970,805	942,050
U.A.R. (Egypt)	1,334,591	1,375,100
Yugoslavia	8,996,689	7,339,795
Total	29,235,000	25,545,000

National Institutes of Health

The Special Foreign Currency Program is a unique resource enabling NIH to utilize opportunities within the excess currency countries for advancement of its programs for biomedical research, manpower and translation and dissemination of scientific literature.

The NIH biomedical research program is oriented toward elucidation of fundamental mechanisms involved in disease processes. Epidemiological studies which are a prominent feature of this NIH program are an effective tool in establishing gross cause and effect relationships especially on a cross-cultural basis. Such studies must progress to sophisticated investigations at the cellular and molecular levels which bring the focus of techniques and concepts from many disciplines such as biochemistry, molecular biology, physiology and immunology to bear upon the problem. This program cuts cross the interests, utilizes the resources and contributes to the programs of all NIH Institutes. The neurology, cardiovascular, cancer, dental and metabolic programs of NIH are extensively and productively involved. A study in Poland of neuromuscular diseases supported by NIH has resulted in the writing and publication, both in English and Polish, of a general atlas of these diseases, which occur so frequently in children. Another laboratory studying cultivation of nerve cells outside the body in tissue cultures has been able to demonstrate for the first time production of the same pathological changes in cultured nerve cells as occur in the human patients with Wilson's disease characterized by aberrant copper metabolism. Such a finding holds promise of a laboratory model system for this and similar disorders. Neurophysiological science is prominent among the national priorities recently established for science by the Yugoslavian government. The complementary interest of NIH will facilitate the development of collaborative programs.

A study of the distribution of cancer cases in Bombay, India, has confirmed the high incidence of cancer of the buccal cavity and oral pharynx and a low risk for cancer of the breast and colon but not rectum. Another project concerned with an investigation of the correlation between viruses and breast cancer in Parsi women has produced, in preliminary studies, the very significant finding that viral particles occur more frequently in breast milk of Parsi women who have high incidence of breast cancer than in milk of American women. This finding has great significance for studies of the role of viruses in etiology of cancer.

The NIH nutrition research program covers the full spectrum of nutrition from fundamental studies concerning the metabolic and physiologic actions of the various nutrients and their requirements in man to practical, applied work aimed at alleviation of malnutrition and nutrition deficiency diseases both in the United States and abroad. The program includes projects relating to normal nutrition, nutritional disorders and nutrition in diseases and stress states. New lines of investigation which are proposed include the question of nutritional factors in mental development; prenatal, maternal and postnatal infant supplementation studies on children; relationships between genetic differences, nutritional variations, and environmental factors as they affect physical growth; effects of malnutrition and of various components of the diet on placental function as related to fetal birth weight, infant development and gestational performance of the mother. Nutritional studies of these types have implications for all ages, ethnic groups and socioeconomic levels in the U.S.

The NIH is developing a biomedical and social science research program directed toward solution of problems in the field of population and family planning and fostering international collaboration and interest in research applicable to the world-wide population problem. The biomedical sciences program includes research in reproductive biology and contraceptive development and evaluation of the medical effects of methods of contraception, abortion and sterilization which are currently in use. In the social sciences, goals of the program include the development of data on population trends and fertility rates and on the causes and consequences of alterations in population size and distribution, as well as the psychological and social determinants of family size and contraceptive practice and the effects of various incentive and disincentive policies.

A number of competent reproductive physiologists in India and Pakistan have been contacted and are interested in pursuing collaborative projects in embryology, reproductive endocrinology, and the metabolic effects of steroid contraceptives. One project under development in India will concentrate on male reproductive physiology in subhuman primates which are native to India and difficult to obtain and maintain in the United States; this project could make an important contribution to knowledge of primate reproduction. A study of the effects of oral contraceptives on carbohydrate and lipid metabolism is under consideration in Pakistan.

A project comparing the medical effects of various methods of abortion has been initiated in Yugoslavia. It will provide significant comparative data on the incidence of complications which will be useful in determining the method of choice for inducing abortion and may be especially important in view of the trend toward liberalized abortion laws in the United States.

The National Library of Medicine provides the U.S. scientific community with access to the world's biomedical literature. The Library plans to expand its selective critical review program in Yugoslavia and its program for publication of translations. Support for production of English-language versions of three Yugoslav health science journals (Archives of Biological Sciences, Acta Medica Yugoslavica, and Medical Journal) will be continued.

Plans are being made to develop a resource in India for translation and abstracting Russian biomedical literature. A bibliographic and abstracting activity on the subject of family planning is under active consideration and a program for preparation of selected critical reviews is being developed. An historic study of Arabic medicine is planned for Egypt, utilizing material hitherto not available to the U.S. scientific community. In Pakistan a program for the translation and abstracting of Far Eastern medical literature is being negotiated. Critical reviews in areas of national interest such as occupational and environmental health are scheduled in Poland. A program for the abstracting of oral health publications appearing in Eastern European dental literature will be implemented.

Poland is specifically noted for its medical progress in occupational health. To promote a better understanding by the U.S. scientific community of the advances made by Polish research scientists in studies related to man's work environment, the National Library of Medicine has supported the writing of several critical reviews in this subject area. The publication of a critical review produced in Poland entitled "The Application of Metabolic and Excretion Kinetics to the Problems of Industrial Toxicology" is imminent. A critical review of the "Biological Effect of Microwave Irradiation," which will identify possible hazards to personnel working with industrial microwave generators such as are used in radio navigation, communications and induction heating, used both in industry and increasingly in the home, was recently undertaken. A third publication will review the contemporary state of knowledge of the incidence of pneumoconiosis in coal miners. The Yugoslav scientific community has demonstrated a high degree of competence in the application of epidemiological techniques to the examination of health problems. To utilize these resources, two Library-sponsored critical reviews are in preparation. One is concerned with "Epidemiology of Functional Psychoses" for the purpose of identifying problems and methodology in unresolved clinical difficulties associated with endogenic psychoses and to point out areas in need of additional research. The other is "Epidemiology of Gastric Cancer". Gastric cancer varies in geographic frequency both internationally as well as within national boundaries. It is currently of interest in migrant population studies and of particular epidemiological interest to this country's biomedical community.

The Bureau of Health Manpower Education objectives for its Special Foreign Currency Program are selected on the basis of their relationships to critical domestic problems of the health manpower pool and specifically to extend and improve programs in dental manpower utilization, particularly in developing new methods of delivering dental services to children and for further studies of nursing needs, resources and career patterns. A study of systems of dental services for children is proposed in both Yugoslavia and Poland to be carried out as a part of a WHO-DHEW international study of dental manpower and utilization and national dental care delivery systems for children. A systematic study such as that proposed would provide an opportunity for the United States to learn first hand, from countries having had long experience in providing dental health services to children, about ways in which new types of manpower have been developed and utilized to make possible the provision of services. A project in Egypt is generating valuable data on an incremental dental care program using mobile units -- a program which provides service to all children ages 6 through 11 without regard to ability to pay. With increasing interest in the United States in the establishment of dental care programs for all segments of the population, including those able to pay for care, a study such as this will be of extreme value in providing data on mechanisms, organization, costs, and manpower including clinical man hours required per child for initial care and maintenance during early adolescence as dental problems change from caries of early childhood to onset of diseases of gingiva and bone. To complement a comprehensive study of the career dynamics of nurses currently underway in the U.S., a study of career patterns among graduates of nursing programs in Yugoslavia is anticipated. Such a study will inquire into the career interests of students and the career patterns of graduate nurses as well as to learn more about the factors leading to change in careers. A study will be made of India's countrywide survey of nursing needs and efforts to relate the data to needs of individual states and national five-year plan. It is anticipated this will contribute to planning for nursing needs as part of total health manpower requirements in the U.S.

Health Services and Mental Health Administration

The Health Services and Mental Health Administration's Special Foreign Currency Program is an important means of strengthening and extending the Administration's domestic research program. Research and training projects carried out under the program are designed to contribute to the accomplishment of HSMHA's primary mission: to become the nation's center of expertise on how health services are organized and delivered to people.

One of the major objectives of the HSMHA Special Foreign Currency Program is to study and evaluate pertinent factors of foreign health systems in order to gain knowledge which can be applied to health services in the United States.

HSMHA health research carried out abroad is differentiated from purely domestic research by utilizing foreign resources which offer unusual research potential; e.g., unique populations, special social conditions or cultural settings. Biological, psychological and cultural factors play varying roles in the etiology, evaluation and outcome of organic and mental disorders. These factors can be better identified and understood when comparative and parallel studies are carried out utilizing as subjects individuals from differing ethnic groups, living in different socio-cultural environments.

Much time is needed for the evaluation of research accomplishments and for their application to currently used techniques in health planning and medical care. Even though the HSMHA Special Foreign Currency Program is quite young some significant accomplishments have already become apparent.

One of the most ambitious HSMHA international projects, still under way, is a broad collaborative study of the utilization of medical care. It encompasses nine studies in seven countries, three of them supported through PL 480 funds. Although the project is not due to terminate until July 1971, the first reports indicate that valuable information with highly practical implications is being obtained in relation to the medical, economic and social factors that affect utilization of medical care and the influence of various features on medical costs in the provision of such care.

A detailed study of the organization of health services in Israel is approaching completion. Progress reports indicate that the project has provided new insights into the advantages and disadvantages of certain features of the Israeli health service system and has allowed us to examine closely those features which have useful implications for the U.S.

A project in India has resulted in greatly improved methods for the isolation and identification of toxic viruses of the gastrointestinal system. These new methods are more sensitive, and less cumbersome, expensive and time consuming.

Another project in Yugoslavia has produced important information with regard to the usefulness of an oral vaccine for the control of dysentery in children.

During FY 1972, HSMHA plans to further develop its Special Foreign Currency Program by renewing a number of highly promising projects and developing new ones in areas of high program priority.

The very successful medical student fellowship programs will be continued and expanded in Yugoslavia. Efforts will be made to develop and operate additional training programs for American medical students and graduate physicians in India, Poland and Tunisia.

To help us find effective ways of dealing with shortages and unequal distribution of physicians, studies will examine various methods of substituting for health manpower, alternate patterns of medical care that conserve manpower, and various means of redistributing available medical manpower.

Studies will also be made to determine more effective and efficient means of organizing medical resources. The major goals of these projects will be to find means of reducing costs, conserving manpower, increasing the effectiveness of medical care by finding ways to minimize hospitalization, and improving and expanding ambulatory care.

Additional studies will be directed at the development of methods to analyze various administrative and technical aspects of medical care (both hospital and ambulatory), and to evaluate the contributions of all types of ancillary health manpower.

FY 1972 plans call for a larger segment of HSMHA funds to be directed toward solving some of the problems of congenital defects and handicapping conditions, a major area of concern in the U.S. New studies will be initiated in six countries and will include such subjects as treatment of congenital bone diseases, incidence and care of congenital amputees, and treatment of various types of severe blood diseases of childhood.

Family planning research continues to have a high priority within HSMHA and studies are planned that will assist in the development of more appropriate and better utilized national family planning services.

HSMHA is also very concerned with the effect of the increased abortion rate on the health of the women and on their subsequent offspring. With the rapid change in state laws removing former restrictions on the performance of abortion, there is a great need to develop more information on what effect, if any, repeated abortions have on the health of women and their ability later to produce normal, healthy children. In Yugoslavia, where women have repeated abortions under what are considered good conditions and where they can be followed up later, we should be able to obtain valuable information that would require many years to obtain in the U.S.

In Yugoslavia and Poland projects will be carried out to determine the effectiveness of early drug therapy in preventing frank hypertensive disease, heart disease, and stroke among population groups with borderline high blood pressure.

In India plans are being made to conduct a pilot study of the delivery of mental health services to the entire population of a circumscribed geographic area. Members of the core mental health professions drawn from primary health centers, the local hospital and the medical school will form an integrated team to develop a community system of coordinated care for the mentally and emotionally ill. The potential of such a system, not only for treatment but for the prevention of mental and emotional illness, is a matter of vital interest among mental health professionals. Renewed support is planned for a research project in Poland which has contributed significantly to the progress of brain-behavior research in that country as well as to the status of similar projects in the U.S.

Finally, in addition to continued support of research projects in such important fields as hepatitis, venereal disease, tuberculosis and hospital-borne infections, HSMHA plans call for new research in areas such as food fortification, food absorption problems in people with gastrointestinal diseases, rheumatic fever, and causative factors in genetic birth defects.

Disease Control

Disease control through environmental health activities is concerned with the preventive public health aspects of the control of environmental hazards to man. The overall effort is aimed at gaining deeper insight into the complex relationship between man and his environment and developing ways of controlling or preventing environmental hazards to human health.

The Special Foreign Currency Program enables the study in excess currency countries of unusual, intensified, or high risk environmental conditions and their health effects. These studies, which provide new knowledge often not readily attainable in the United States, are directed toward meeting U.S. domestic objectives and priorities for occupational health, radiation control, and improving the quality of human settlements.

Occupational environment and illness studies are providing valuable research data on levels of worker exposure to (1) toxic industrial chemicals (lead, mercury, carbon disulfide), (2) industrial heat (heat stroke and heat exhaustion, prevention and treatment), (3) dust related chest diseases (coal mining pneumoconiosis, asbestosis, byssinosis, chemical fertilizers, and pesticide manufacture), and (4) noise and vibration. Generally, such exposures are higher than in the United States and can be closely compared with the toxicologic and other effects on the study population. This is possible because of the stable European work population and the centralized medical services and vital statistics records systems in these countries.

The acquisition of such data on high priority occupational health problems in the United States reduces the need for costly studies of the U.S. work population and provides information which can be used to prevent dangerous working conditions from being practiced or extended into U.S. manufacturing processes. For example, long-term exposure records on the stable uranium mining and processing work population in Yugoslavia have supplemented U.S. scientific data. Thus, modification of exposure standards was expedited so that appropriate control measures could be applied to reduce future occupationally-related deaths in the work force of the U.S. uranium industry. In Yugoslavia, studies involving the use of isoniazid prophylactic treatment for altering the progression of coal workers' pneumoconiosis have allowed a dimension of research on human subjects not possible in the U.S.

Radiation effects on man have been studied in Israel with special concern for latent development of mental and nervous disorders and neoplasms resulting from X-irradiation of the scalp of children for treatment of tinea capitis. Data from a population of 30,000 patients have been developed in this study. The well-developed system of records and vital statistics in Israel have proven to be a valuable resource for this epidemiologic study. Similar valuable records are maintained on tuberculosis patients. By examination of these records it is planned to investigate the effect of X-irradiation of the chest among persons exposed to numerous fluoroscopic examinations of lung and breast cancer which is reportedly excessive among tuberculosis patients. Additional patient groups identified in the Mediterranean area who have received high therapeutic doses of radiation during their youth and who may provide additional morbidity-mortality information on latent effects of radiation exposure will be studied as a coordinated effort in Egypt, Tunisia, and Morocco.

Radiation responsibilities in the Department were greatly expanded with the enactment of the Radiation Control for Health and Safety Act (P.L. 90-602). In

FY 1972 it is planned to institute collaborative research and scientific exchange with experts in Poland, Yugoslavia, and India on such problems as hazard evaluation of neutron generation, particularly as related to particle accelerators; and, evaluation of non-ionizing radiation measurement techniques as related to a wide variety of electronic products which are particularly hazardous due to radiation emissions.

The protection of health and safety of residents of urban, suburban, and rural settlements in specific human ecological areas is of great concern to the Public Health Service. The major focus is on developing means of maintaining or changing both the man-built physical surroundings and the attitudes and behaviors of social environment which are relevant to the healthful and safe use of built environment. Activities are directed toward generating health and safety criteria and standards for the design, maintenance, and use of human surroundings, community environmental management systems as guidelines for planning and implementing health protection programs. Foreign research projects reflect the requirements of domestic programs and are designed to provide insight into means of reducing or preventing physical and mental disease and promoting social well-being.

For FY 1972 research under the Special Foreign Currency Program is planned in three areas. First, human ecology research designed to ascertain the dynamics of health ecosystems, including both the physical and social environmental factors which affect changes in health status and morale. Such studies include investigation of stressors in respect to both the physical surroundings and social environment of human settlements, under different climatic conditions and under land use and population densities ranging from rural to congested urban. Second, basic health and safety criteria research for standards of design, maintenance, occupancy, and use of residential and community recreational environments, followed by evaluative health and safety research of developments built and used under the guidance of such standards. Third, applied and evaluation research and development of community health environmental management systems, including public administration process and procedures, legal relationships and responsibilities, and community organization and health education techniques, which lead to better private and public management as measured by health status change in evaluation of demonstration programs.

Food and Drug Administration

The program needs of the Food and Drug Administration (FDA) are specialized and oriented toward its domestic mission of protecting consumers of foods, drugs, therapeutic devices, cosmetics, and hazardous household products. Research projects supported under the Special Foreign Currency Program are designed to provide research answers to critical issues which bear upon FDA's scientific and regulatory efforts in the United States.

Controlled studies are currently being conducted in Yugoslavia to determine whether there is any relationship between oral contraceptive drug use and abnormalities in cervical cytology and histology, subsequent fertility, and the development of congenital anomalies in the children of women using these drugs. Another related study is attempting to further elucidate changes in carbohydrate and liquid metabolism as induced by selected oral contraceptives.

For FY 1972, a comprehensive foreign research program in a number of critical areas is being developed. Proposed projects include studies to determine the ecological impact of low level usage of antibiotics and their effect on the environment; effect of food additives and industrial chemicals on geriatric and neonatal primates; and problems associated with mycotoxin (aflatoxin) exposure in food and/or diet and its potential association with human liver cancer. A study which is being developed in India will use nonhuman primates to study the effects of exposure to mycotoxins in foods. Through this study, FDA expects to secure important data and information to better regulate fungally contaminated products and thus offer the consumer better protection.

As part of its effort to ensure safe, pure, wholesome and nutritionally adequate foods, the FDA will in FY 1972 concentrate on the development and implementation of research projects aimed at GRAS substances literature search and toxicological examination. The President, in his Consumer Message of October 1969, directed the FDA to review the Generally Recognized as Safe (GRAS) list. The accomplishment of this mission will necessitate a review of the scientific literature relevant to uses and levels of use of approximately 600 compounds for the period 1920-1970 and the screening of these compounds through toxicological testing to determine the effects of the chemicals relevant to a spectrum of adverse results. Since many of these chemicals are of worldwide importance, research collaboration under the Special Foreign Currency Program will be useful in achieving the FDA's goal. Additional planned projects include studies of iodide fortification of foods, composition of fruit and fruit products, and contamination of spices.

High priority is also being given to research concerning drug bioavailability and drug interaction. Controlled drug interaction studies are expensive and difficult to arrange. If satisfactory animal models can be developed for screening, the evaluation of drugs and the development of new drugs can be greatly facilitated. Poland, Yugoslavia, and India offer excellent opportunities for cooperative research in the drug area. India, with its large supply of subhuman primates and widespread experience in the use of this group in testing drugs, provides us with an excellent opportunity to enter into further collaborative projects which will form a base for guidance in drug testing in the United States. In FY 1972 efforts will be made to extend the drug research program to include such important health issues as possible interactions between anti-Parkinson drugs and other CNS-active drugs, drug interactions with insulin, adverse drug reaction reporting programs, and efficacy in selected categories.

Projects are also planned for development in the field of veterinary medicine. Bioavailability of drugs and the development of chemical assay methodology both in animal feed and animal tissue are of special interest to FDA and its mission to protect the public health of the Nation as it may be affected by foods and drugs.

Office of International Health

Travel funds are requested by the Office of International Health to enable the PHS Program coordinator and members of the professional staff to visit countries in which excess currencies are available. Travel will be performed for the purpose of developing policy and program objectives consistent with both United States and host country interests. Working relationships with the Ministries of Health will be developed and potential project areas explored.

Program Purpose and Accomplishments

Activity: Foreign health research (Agricultural Trade Development and Assistance Act of 1954, as amended, Section 104(b); International Health Research Act of 1960, Section 308)

1971			1972	
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
--	$28,944,000	Indefinite	--	$25,545,000

Purpose: Funds are used to support collaborative health research and research-related projects abroad. The Program helps achieve the domestic health objectives of the Department and promotes United States foreign policy. Activities are directed toward the prevention and control of diseases and the development of mechanisms for the promotion of health in the United States and other countries.

Explanation: The Program is supported entirely by foreign currencies owned by the United States which have been determined by the Treasury to be in excess of normal United States needs in the countries. Payments are made for necessary expenses for conducting research and other activities, as authorized by law.

Accomplishments in 1971: In 1971 more than 100 new projects were funded, an increase of more than 84 over 1970. Primary emphasis was on studies to improve the organization and delivery of health service and biomedical research.

Objectives for 1972: The estimate for 1972 provides for an estimated 75 new projects and additional support for approximately 30 ongoing projects. Research in the fields of population and family planning; nutrition; and the organization and delivery of health services, particularly in the area of maternal and child health, will be emphasized. The programs of biomedical research and health communications will be strengthened.

Scientific Activities Overseas (Special Foreign Currency Program)

STATEMENT OF DR. S. PAUL EHRLICH, JR., DIRECTOR, OFFICE OF INTERNATIONAL HEALTH

Senator Magnuson. Dr. Ehrlich.

Dr. Ehrlich. Mr. Chairman and members of the committee, I am Dr. S. Paul Ehrlich, Jr., Director of the Office of International Health which is a staff office reporting to the Assistant Secretary for Health and Scientific Affairs.

The Office of International Health serves as the principal focal point in the Department for policy guidance and program coordination of all international health activities. It participates with the Department of State in formulating U.S. positions and policies relating to the World Health Organization and in other foreign policy health matters; maintains liaison with international health-related institutions and organizations and other departments and agencies; and provides assistance and guidance in the general field of international health to the health agencies administered by the Assistant Secretary. The office has specific responsibility for the administration and coordination of the Special Foreign Currency Program for the agencies under the jurisdiction of the Assistant Secretary for Health and Scientific Affairs. It is the budget for this program that we are presenting today.

The Special Foreign Currency Program in HEW is carried out under the authority of section 104(b)(3) of the Agricultural Trade Development and Assistance Act of 1954, as amended (Public Law 83–480), and the International Health Research Act of 1960, Public Law 86–610, section 308. The program is supported entirely by U.S.-owned excess foreign currencies which have been determined by the Treasury Department to be in excess of normal U.S. needs in certain designated countries. These excess currencies must be used in the foreign countries involved and there is no appropriated program dollar outflow from the United States. As the committee is aware, this activity is not in competition in any way whatsoever with the domestic program appropriation.

Our health agencies use these foreign funds to support health research and research related activities in foreign countries that complement and extend their programs to fulfill domestic responsibilities. These foreign currencies have enabled the Department to carry out productive and significant research projects taking advantage of unique resources and conditions within the host country. Primary emphasis is on the development of projects addressed to problems relating to the organization and delivery of health services, disease prevention and control, basic biomedical research, population and family planning, and food and drug consumer protection, all of which are directly relevant to high priority United States health needs. Considerable attention has also been given to a program of translating foreign health literature and critical literature reviews for the benefit of the American medical community. This activity makes available important medical and health information and knowledge which are published only in foreign languages.

For fiscal year 1971 we requested and received an appropriation of $32,444,000 for the use of foreign currencies. The request for this amount was justified and approved on the basis of a large backlog of projects which the health agencies had not been able to fund due to the severely reduced budget for the program in fiscal year 1970. The fiscal year 1970 special foreign currency appropriation was only about $3.5 million and enabled the health agencies to fund just 16 new projects for the entire year. The balance of the appropriation, other than new project funding, was required to provide supplemental funds for ongoing research in order to avoid disruption of work and the loss of scientific data.

When I testified last year at the fiscal year 1971 appropriation hearing, 193 projects totaling the equivalent of $24,576,242 in local currencies were either ready for funding or in the review process. Additional projects were being negotiated or were planned for development during 1971. The fiscal year 1971 appropriation has allowed us to dispose of this large backlog of projects, and at the same time, to develop a significant number of new activities designed to contribute to our high priority domestic health programs.

We are requesting $25,545,000 for fiscal year 1972. This is nearly a $7 million reduction from our fiscal year 1971 appropriation as a result of two major factors. First, with the establishment of the new Environmental Protection Agency and the relocation of selected HEW programs, $3.5 million of our fiscal year 1971 funds were transferred with these activities to the new agency. The fiscal year 1972 request for these and other environmental programs is now included in the Environmental Protection Agency budget. Secondly, the large backlog of funded projects is no longer a major problem and the budget accordingly is moving to a lower level consistent with projected requirements. The decrease, therefore, does not represent a reduced program effort but rather reflects a carefully planned increase in funds for new projects.

In developing this program, a number of factors were taken into consideration. These included not only the research needs of the HEW health agencies, but also their staff resources for project planning and monitoring, the prospective research potential in the foreign countries, and the long-range availability of the excess foreign currencies. In addition, we are concentrating on the maintenance of high quality standards through vigorous reviews by highly qualified experts and improved project surveillance. A principal focus in our new program development has been increased attention to national high priority subject matter areas in contrast to the emphasis on more limited basic research interests of the past.

In summary, the favorable congressional action on the fiscal year 1971 appropriation request has enabled us to proceed with planning for a more stable and better organized program at a reduced level for fiscal year 1972. I will be pleased to answer any questions you may have.

COORDINATION WITH AGENCY FOR INTERNATIONAL DEVELOPMENT

Mr. MAGNUSON. How do you coordinate your activities with the medical programs of the Agency for International Development?

Dr. EHRLICH. At the present time, there are AID health programs in only four of the "excess currency" countries: India, Pakistan, Tunisia, and Morocco. Efforts are made by the health agencies to utilize research opportunities in these countries, which will contribute to the AID health program.

In some instances, the same health agency operational unit which undertakes Public Law 480 projects in these countries, also provides services to the AID mission. For example, in India, the Center for Disease Control, which has responsibility for the AID malaria assistance in India, also sponsors a Public Law 480-supported project to study the feasibility of genetic control of mosquitoes in India. In Pakistan, the center utilizes Public Law 480 funds to support a study on the anopheles stephensi mosquito, a primary vector of malaria. Also, in Pakistan, the Southeast Asia Treaty Organization's Cholera Laboratory in Dacca, which carries out applied research in methods to control cholera in this area, is supported by the National Institutes of Health, with funds made available by AID, as well as an NIH project funded under the special foreign currency program. Staff for the laboratory is provided by the Center for Disease Control.

Although the special foreign currency program activities of the health agencies are limited to research and research-related activities, and AID's activities are directed principally toward assistance, there is an overlap of research interests. In India, for example, the Agency for International Development was interested in introducing enrichment of cereal proteins with lysine and other essential amino acids, to improve the nutritional quality of cereals furnished through foreign aid or produced locally. Two projects sponsored by the National Institutes of Health, one in Mysore and one in Vellore, carried out studies which provided strongly supportive evidence for the lysine enrichment of wheat. This type of nutritional enrichment has not been introduced in foreign aid programs. The NIH studies in India also justified the introduction of lysine into India's "modern bread" program.

The same type of cooperation also holds for the population and family planning program.

BUDGET REDUCTION

Senator **Magnuson**. Your budget request of $25,545,000 is a good sized cut from your fiscal year 1971 level of $28,944,000. Why have you made this cut?

Dr. **Ehrlich**. As you recall, our fiscal year 1971 budget request was largely justified and approved on the basis of a large backlog of projects which the health agencies had not been able to fund due to a severely reduced budget for the program in fiscal year 1970. The fiscal year 1970 appropriation was only $3,455,000 and permitted the funding of only 16 new projects that year. As a result, a large number of good approved projects were carried over into fiscal year 1971. In addition, a significant number of new activities, designed to contribute to our high priority domestic health goals, were either being developed or were planned for developemnt in fiscal year 1971. The fiscal year 1971 appropriation enabled us to not only dispose of the backlog of projects but permitted the funding of a number of important new activities.

The reduction also reflects the transfer of selected environmental activities to the new Environmental Protection Agency. The fiscal year 1972 request for these activities is now included in the Environmental Protection Agency budget request.

Our fiscal year 1972 budget request of $25,545,000 does not represent a reduction in program effort but rather a carefully planned increase in funds for new activities that is consistent with actual program needs.

Senator MAGNUSON. Thank you.

HEALTH MANPOWER

Justifications

Appropriation Estimate

HEALTH MANPOWER

To carry out, to the extent not otherwise provided, sections 301, 306, 309, 311, *422 with respect to training grants,* title VII, and title VIII of the Public Health Service Act, [$275,934,000] *$541,925,000, of which $98,000,000 shall be available to carry out part A of title VII of said Act and shall remain available until expended.*

[Loans, grants, and payments for the next succeeding fiscal year: For making, after March 31 of the current fiscal year, loans, grants, and payments under section 306, parts C, F, and G of title VII, and parts B and D of title VIII of the Public Health Service Act for the first quarter of the next succeeding fiscal year, such sums as may be necessary, and obligations incurred and expenditures made hereunder shall be charged to the appropriation for that purpose for such fiscal year: *Provided,* That such payments pursuant to this paragraph may not exceed 50 per centum of the amounts authorized in section 306, parts C and G of title VII, and part B of title VIII for these purposes for the next succeeding fiscal year.]

[DENTAL HEALTH]

[To carry out, to the extent not otherwise provided, sections 301 and 311 of the Public Health Service Act, and for training grants under section 422 of the Act, $11,014,000.]

[CONSTRUCTION OF HEALTH EDUCATIONAL, RESEARCH, AND LIBRARY FACILITIES]

[To carry out part B of title VII, and part A of title VIII of the Public Health Service Act with respect to grants for construction of facilities, $141,100,000; including, for dental facilities as authorized by subsections (2) and (3) of section 720 of the Act, an amount equal to 20 per centum of the appropriation for construction of teaching facilities for medical, dental, and other health personnel; to remain available until expended.]

Explanation of Language Changes

Three appropriation accounts--Health manpower, Dental health, and Construction of health educational, research, and library facilities--are being consolidated into one--Health manpower. Accordingly, reference to carrying out training grants under section 422 of the Public Health Service Act which authorizes dental training grants is incorporated into the 1972 appropriation language.

In addition, reference is made to part A of title VII of said Act which will authorize construction assistance for all teaching, research, and library facilities under the proposed extension and modification of currently existing authorities which expire June 30, 1971.

The paragraph authorizing advance obligational authority will be unnecessary under the proposed extension and modification of currently existing authorities which expire June 30, 1971. Such advance authority will be incorporated into the basic legislation.

Amounts Available for Obligation

	1971	1972
Appropriation	$428,048,000	$541,925,000
Real transfer to:		
"Departmental Management"	-98,000	---
Real transfer from:		
"National Institute of General Medical Sciences" (Proposed transfer for increased pay costs)	1,179,000	---
Comparative transfers to:		
"National Institute of Dental Research"	-401,000	---
"Office of the Director"	-51,000	---
Comparative transfers from:		
"National Cancer Institute"	2,470,000	---
"Division of Biologics Standards"	295,000	---
"National Heart and Lung Institute"	4,332,000	---
"National Institute of Dental Research"	985,000	---
"National Institute of Arthritis and Metabolic Diseases"	3,597,000	---
"National Institute of Neurological Diseases and Stroke"	2,844,000	---
"National Institute of Allergy and Infectious Diseases"	1,745,000	---
"National Institute of General Medical Sciences"	5,361,000	---
"National Institute of Child Health and Human Development"	1,057,000	---
"National Eye Institute"	773,000	---
"National Institute of Environmental Health Sciences"	274,000	---
Subtotal, budget authority	452,410,000	541,925,000
Unobligated balance, start of year	2,939,413	15,000,000
Unobligated balance, end of year	-15,000,000	---
Appropriation available in prior year	-59,422,217	-76,860,000
Appropriation available from subsequent year	76,860,000	76,860,000
Total, obligations	457,787,196	556,925,000

Obligations by Activity

Page Ref.		1971 Estimate		1972 Estimate		Increase or Decrease	
		Pos.	Amount	Pos.	Amount	Pos.	Amount
23	Medical, dental, and related health professions:						
	(a) Institutional support.........		$147,350,000		$256,358,000		+$109,008,000
	(b) Student assistance......		40,500,000		47,637,000		+7,137,000
	(c) Construction....		120,806,838 1/		113,000,000 2/		-7,806,838
	(d) Educational grants and contracts, and direct operations.	329	14,924,000	382	17,050,000	+53	+2,126,000
43	Nursing:						
	(a) Institutional support.........		11,500,000		18,200,000		+6,700,000
	(b) Student assistance......		44,580,000		38,080,000		-6,500,000
	(c) Construction....		8,232,575 3/		---		-8,232,575
	(d) Educational grants and contracts, and direct operations.	145	9,196,000	153	10,720,000	+8	+1,524,000
58	Public health:						
	(a) Institutional support.........		9,571,000		9,571,000		---
	(b) Student assistance......		8,400,000		8,400,000		---
	(c) Direct operations......	24	530,000	24	573,000	---	+43,000
63	Allied health:						
	(a) Institutional support.........		9,750,000		10,000,000		+250,000
	(b) Student assistance......		3,750,000		3,750,000		---
	(c) Educational grants and contracts, and direct operations.	44	5,987,000	64	16,904,000	+20	+10,917,000
69	Program direction and manpower analysis:						
	(a) Planning and analysis........	106	3,193,000	133	4,010,000	+27	+817,000
	(b) Program direction.......	97	2,079,000	124	2,672,000	+27	+593,000
	Total, budget authority plus carryover...........	745	440,349,413	880	556,925,000	+135	+116,575,587
	Appropriation available in prior year..		-59,422,217		-76,860,000		-17,437,783
	Appropriation available from subsequent year................		76,860,000		76,860,000		---
	Total obligations...		457,787,196		556,925,000		+99,137,804

1/ Includes carryover of $2,706,838.
2/ Includes carryover of $15,000,000.
3/ Includes carryover of $232,575.

Obligations by Object

	1971 Estimate	1972 Estimate	Increase or Decrease
Total number of permanent positions.........	745	880	+135
Full-time equivalent of all other positions.	73	75	+2
Average number of all employees............	769	874	+105
Personnel compensation:			
Permanent positions......................	$10,083,000	$12,314,000	+$2,231,000
Positions other than permanent...........	613,000	809,000	+196,000
Other personnel compensation.............	44,000	44,000	---
Subtotal, personnel compensation.........	10,740,000	13,167,000	+2,427,000
Personnel benefits........................	979,000	1,171,000	+192,000
Travel and transportation of persons........	1,037,000	1,319,000	+282,000
Transportation of things..................	51,000	75,000	+24,000
Rent, communications and utilities..........	364,000	516,000	+152,000
Printing and reproduction..................	242,000	273,000	+31,000
Other services............................	810,000	924,000	+114,000
Project contracts........................	5,348,000	7,128,000	+1,780,000
NIH Management Fund.....................	1,471,000	1,594,000	+123,000
Supplies and materials.....................	179,000	208,000	+29,000
Equipment.................................	92,000	168,000	+76,000
Investments and loans......................	47,610,000	28,360,000	-19,250,000
Grants, subsidies and contributions........	388,864,196	494,022,000	+105,157,804
Interest and dividends.....................	---	8,000,000	+8,000,000
Total obligations by object..............	457,787,196	556,925,000	+99,137,804

Summary of Changes

1971 Budget Authority	$452,410,000	
Unobligated balance, start of year	2,939,413	
Unobligated balance, end of year	-15,000,000	
1971 estimated obligations[1/]		$440,349,413
1972 budget authority	$541,925,000	
Unobligated balance, start of year	15,000,000	
1972 estimated obligations[1/]		$556,925,000
Net change		+116,575,587

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
1. Annualization of 1971 pay increase costs	---	---	---	+$663,000
2. Annualization of positions new in 1971	---	---	---	+82,000
3. Within-grade pay increases	---	---	---	+130,000
4. Extra day of pay	---	---	---	+30,000
5. FTS cost increase	---	---	---	+11,000
B. Program:				
(Medical, dental, and related health professions)				
1. Formula/capitation grant institutional support	---	$46,800,000	---	+46,558,000
2. Project grant institutional support	---	100,550,000	---	+17,450,000
3. Health manpower education initiative awards	---	---	---	+45,000,000
4. Scholarships	---	15,500,000	---	+13,387,000
5. Dental auxiliary utilization--Training in expanded auxiliary management	---	3,651,000	---	+600,000
6. Direct operations	329	7,789,000	+53	+1,446,000
(Nursing)				
7. Project grant institutional support	---	11,500,000	---	+6,700,000
8. Traineeships	---	10,470,000	---	+1,000,000
9. Direct operations	145	4,987,000	+8	+1,341,000
(Allied health)				
10. Special improvement grants	---	---	---	+10,000,000
11. Special projects	---	4,495,000	---	+10,250,000
12. Direct operations	44	1,385,000	+20	+559,000
(Program direction and manpower analysis)				
13. Planning and analysis	106	3,031,000	+27	+700,000
14. Program direction	97	1,877,000	+27	+445,000
C. Payment to "National Institutes of Health management fund" for centrally furnished services:	---	1,471,000	---	+123,000
Total, increases	---	---	+135	+156,475,000

	Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Decreases:				
A. Program:				
1. Health professions student loans	---	25,000,000	---	-6,250,000
2. Construction assistance	---	129,039,413	---	-16,039,413
3. Dental educational grants	---	982,000	---	-60,000
4. Nursing student loans	---	17,110,000	---	-7,500,000
5. Allied health basic improvement grants	---	9,750,000	---	-9,750,000
6. Direct operations	---	300,000	---	-300,000
Total, decreases	---	---	---	-39,899,413
Total, net change	---	---	+135	+116,575,587

1/ Excludes advance obligational authority.

Explanation of Changes

Increases

Built-in

The built-in increases will provide: $663,000 for the annualization of 1971 pay increase costs; $82,000 for the annualization of 23 new positions authorized in 1971; $130,000 for within-grade pay increases in 1972; $30,000 for an extra day of pay in 1972 compared to 1971; and $11,000 for increased cost in 1972 of using the Federal Telecommunications System.

Program

(MEDICAL, DENTAL, AND RELATED HEALTH PROFESSIONS)

Formula/capitation grant institutional support

The requested increase of $46,558,000 over the 1971 level of $46,800,000 will provide capitation grants to schools of medicine, osteopathy, and dentistry primarily on the basis of $6,000 for each of the students graduated to help assure the financial viability of the schools. Formula grants in 1971 were awarded to schools of medicine, osteopathy, and dentistry totalling $31,700,000 and to schools of optometry, pharmacy, podiatry, and veterinary medicine totalling $15,100,000.

Project grant institutional support

The requested increase of $17,450,000 over the 1971 level of $100,550,000 will provide broad-range assistance to all health professions schools to increase enrollments, to improve faculty and curricula, and to alleviate the difficulties of schools in serious financial straits.

Health manpower education initiative awards

The requested increase of $45,000,000 will initiate a program to meet special health manpower needs including the establishment of area health education centers. Emphasis will also be placed on initiating physician assistants training programs.

Scholarships

The requested increase of $13,387,000 over the 1971 level of $15,500,000 will provide scholarships to 30,436 health professions students compared to 17,669 students in 1971. The existing program for all health professions students will be phased out over a period of several years beginning in 1972 in favor of a more liberal new program for medical, osteopathic, and dental students in their first two years of school only. The 1972 support includes 11,053 students being aided in 1971 who will remain eligible for funds until graduation and 19,383 freshman and sophomore medical, osteopathic, and dental students will participate in the new program. It is anticipated that Office of Education Guaranteed Loans will be available in their last two years. Under this new program, each school will receive funds in proportion to its disadvantaged students enrolled.

Dental Auxiliary Utilization (DAU)--Training in Expanded Auxiliary Management (TEAM)

The requested increase of $600,000 will support at least eight high quality projects to teach dental students the techniques of working with, managing, and supervising auxiliaries trained in expanded functions.

Direct operations

The requested increase is for 53 positions and $1,446,000 over the 1971 base of 329 positions and $7,613,000. Thirty-six positions will be used to administer the new program of health manpower education initiative awards which will include the establishment of area health education centers; ten will be used for institutional representatives to a specified group of health professions schools to whom the schools can refer problems and questions, four positions will be used in support of new projects especially concerning the development of physician assistants; and three positions and $350,000 primarily for contracts will extend activities to establish and maintain surveillance of public water supply and to institute school fluoridation programs in approximately 30 elementary schools.

(NURSING)

Project grant institutional support

The requested increase of $6,700,000 over the 1971 level of $11,500,000 will provide a total of 233 grants compared to 199 funded in 1971. The increase will support 40 new physician assistant projects such as those for training pediatric nurse practitioners, nurse midwives, and family health nurse practitioners. These projects are designed to increase and augment patient care services through extending the capabilities of physicians by expanding the functions of the nurse. Approximately 400 nurses will receive this training.

Traineeships

The requested increase of $1,000,000 over the 1971 level of $10,470,000 will provide approximately 2,205 long-term traineeships, an increase of 205 registered nurses enrolled in advanced nursing programs.

Direct operations

The requested increase of eight positions and $1,341,000 over the 1971 base of 145 positions and $4,922,000 includes $1,200,000 for contracts. Three positions and $1,000,000 in contract funds will make it possible for 15 more states to initiate and carry out refresher training programs designed to increase the nursing work force. Five positions will staff the activity administering the (nurse) physician assistant projects; $200,000 in contract funds will provide resources within the regional offices to meet some of the specific needs of state and local jurisdictions as contrasted with programs which are national in scope.

(ALLIED HEALTH)

Special improvement grants

The requested increase of $10,000,000 will initiate a program of special improvement grants to be made on a project basis in support of programs in allied health training centers. This program will replace the formula-type of support available in 1971 at a level of $9,750,000. It will provide support to those schools which have the greatest potential for curriculum improvement and expansion of enrollment capacity, and will allow concentration on high priority areas. Approximately 100 projects will be awarded in 1972.

Special projects

The requested increase of $10,250,000 over the 1971 level of $4,495,000 will provide an additional 105 grants over the 45 funded in 1971. A major portion of the increase will be directed into projects to accelerate the production of physician and dentist assistants by increasing enrollments in currently operating programs and by establishing five or six new programs. In operation MEDIHC, we will also emphasize a program of career counselling and guidance for returned veterans with health skills.

Direct operations

The requested increase of 20 positions and $559,000 over the 1971 base of 44 positions and $1,365,000 includes $225,000 for contracts to be administered through the regional offices to support the development of education and training programs which are most responsive to local needs for health manpower. Ten positions will be allocated to strengthen the regional office staffs. These positions will be responsible for technical assistance to educational institutions and for management of program activities decentralized to the regions. Ten positions will be used for high priority functions, particularly the registration, certification, and licensure of health personnel; in equivalency and proficiency testing; and in curriculum development for physician assistants.

(PROGRAM DIRECTION AND MANPOWER ANALYSIS)

Planning and analysis

The requested increase of 27 positions and $700,000 over the 1971 base of 106 positions and $2,981,000 includes $305,000 for contracts to strengthen data gathering and reporting, the lack of which was noted in House Report No. 91-1266, dated June 30, 1970, on the Extension of Programs for Training in the Allied Health Professions. Seventeen positions will support new data collection, analysis, reporting, and a national clearinghouse for health manpower information. Ten positions will be used for program planning, program evaluation, and coordination affected by new legislative and administrative responsibilities.

Program direction

The requested increase of 27 positions and $445,000 over the 1971 base of 97 positions and $1,835,000 will be used to provide an associate regional health director responsible for direction of Bureau programs and one support person for each of nine regions (the tenth was staffed in 1971); nine positions will be required in the Office of the Bureau Director to perform special analyses related to the new programs, for increased congressional correspondence, and related administrative services.

Decreases

Program

Health professions student loans

The total of $18,750,000 requested for fiscal year 1972, a decrease of $6,250,000, will assist 16,300 eligible students. The present health professions student loan program will be phased out in favor of the Office of Education's Guaranteed Loan program. Funds however, are requested in the decreasing amount shown to support those students who had received loans prior to 1972 so that they may complete their studies.

Construction assistance

The 1972 request of $113,000,000 (including a carryover of $15,000,000 from 1971) is a decrease of $16,039,413 under the 1971 level. This request, however, in line with the new legislative authority being proposed includes $8,000,000 to provide a three percent interest subsidy in a guaranteed loan program covering no more than ninety percent of the cost of a facility for private school construction which will support an additional $296,000,000 in loans for construction projects.

Dental educational grants

The amount requested in 1972 of $922,000 is a decrease of $60,000 under the 1971 level. Seventeen grants will be supported in 1972 compared to 24 in 1971.

Nursing student loans

The total of $9,610,000 requested for 1972 is a decrease of $7,500,000 under the 1971 level and will support 13,700 students. The present nursing student loan program will be phased out in favor of the Office of Education's Guaranteed Loan program. However, funds are requested in the decreasing amount shown to support those students who had received loans prior to 1972 so that they may complete their studies.

Allied health basic improvement grants

The program decrease of $9,750,000 in 1972 represents a shift from the allied health statutory formula grant to a more flexible project-type special improvement grant and is offset by an increase of $10,000,000 for allied health special improvement grants.

Direct operations

A program decrease of $300,000 in 1972 is a shift of medical continuing education activities to other agencies of the Public Health Service.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or To Be Taken
1971 House Report	
Manpower Programs' Attention to Returning Military Paramedical Personnel	
1. Committee interest in affording every opportunity, and offering every encouragement, to returning nonprofessional medical military personnel to remain in the medical field when they return to civilian life and thus make a valuable contribution toward relieving our serious shortage of medical care personnel and at the same time secure relatively well paid and personally satisfying employment (page 4 of the House Report).	1. A plan to increase the number of medically trained military personnel in civilian health employment by five percent each year for the next five years is currently in operation. This plan also includes provisions for tripling the number in education/training programs by 1972. The Department of Defense, through its Project TRANSITION Office, identifies, contacts, and counsels servicemen with military medical occupational specialties three or more months prior to discharge on civilian health careers education, and employment opportunities. The Department of Health, Education, and Welfare, through its Regional Offices has identified existing and/or potential resources in each of the States to carry out the program. The State agency most able to effectively counsel the men on health careers opportunities, to work with educational institutions and to identify sound employment opportunities has been asked to assume responsibility for the program. The number of reported referrals was 6,500 through January 31, 1971. California, with 1,000 and Texas with over 500, had by far the largest caseloads. Pennsylvania and New York have reported over 200 referrals. The other states have reported caseloads which range from 100 down to 10. Sixty-eight per cent of the applicants want additional education in their present or in another health occupation. Texas, the only State with an adequate feedback mechanism, reports placing 68 percent of its applicants in either employment or education.

Significant Items in House and Senate Appropriations Committee Reports

Item	Action Taken or To Be Taken
1971 Senate Report	
Health Manpower Training Programs	
1. Last year the committee requested the Director of the National Institutes of Health to conduct a comprehensive review of the current status and relationship of all major Federal programs concerned with health manpower, and to make recommendations on the future development of the NIH manpower programs. That report was expected to be ready before the end of the last calendar year. In September, the Secretary submitted to the Congress two reports in accordance with the Health Manpower Act of 1968 which covered the health professions and nurse training programs. Both of these reports were devoid of substance and failed to make any recommendations. The Committee expects the forthcoming report of the Director of NIH to be more worthwhile and to be of real assistance to the Congress by including recommendations about the future development of the health manpower programs and the options available to the Congress (pages 31 and 32 of the Senate Report).	1. A comprehensive compilation of 144 health manpower programs conducted by 13 Federal departments and independent agencies has been assembled and the current status and relationships of these programs, as of 1970, reviewed. The two-part report requested by the Senate Appropriations Committee has been furnished to the Contress.
Construction of Health, Educational, Research and Library Facilities	
2. Committee expectation that a portion of the construction funds allowed would be used in reducing a large backlog of approved but unfunded applications for construction grants for Schools of Veterinary Medicine (page 55 of Senate Report).	2. A construction grant from 1971 funds has been awarded to a school of veterinary medicine.

Authorizing Legislation

Legislation	1972 Authorized	 Appropriation requested
Public Health Service Act		
Section 301--Research Grants, Research Training Grants and Research Fellowships	Indefinite	$6,190,000
Section 306--Traineeships for Professional Public Health Personnel	$16,000,000	8,400,000
Section 309--Project Grants for Graduate Training in Public Health and Grants to Schools of Public Health	27,000,000	9,571,000
Section 422-Dental Auxiliary Utilization Training Grants, Grants for Continuing Education of Dentists, and Training in Expanded Auxiliary Management	Indefinite	4,451,000
Section 701--Health Manpower, Research, and Library facilities construction assistance	1/	98,000,000
Section 721--Grants to Improve the Quality of Training for Allied Health Professions	55,000,000	24,745,000
Section 722--Traineeships for Advanced Training of Allied Health Professions Personnel	10,000,000	3,750,000
Section 742--Health Professions Student Loans	2/	18,750,000
Section 770--Institutional Grants to Improve the Productivity and Quality of Health Education	1/	163,000,000
Section 771--Capitation Grants	1/	93,358,000
Section 780--Scholarship Grants to Schools of Medicine, Osteopathy, Dentistry, Optometry, Podiatry, Pharmacy, or Veterinary Medicine	3/	28,887,000
Section 803--Special Project and Institutional Grants to Schools of Nursing	1/	18,200,000
Section 821--Traineeships for Advanced Training of Professional Nurses	1/	11,470,000
Section 824--Nursing Student Loans	2/	9,610,000
Section 860--Scholarship Grants to School of Nursing	3/	17,000,000

1/ Authorization expires June 30, 1971; extension legislation is proposed.

2/ Authorization expires June 30, 1971, except for such sums as may be necessary to enable students who have received loans for any academic year prior to July 1, 1971 to complete their education.

3/ Authorization expires June 30, 1971, except for such sums as may be necessary to enable students who have received scholarships for any academic year prior to July 1, 1971 to complete their education; extension legislation is proposed.

Title III - Part A - Research and Investigation

Research Grants, Research Training Grants and Research Fellowships

Section 301. The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification, sewage treatment, and pollution of lakes and streams. In carrying out the foregoing the Surgeon General is authorized to--...

(c) Establish and maintain research fellowships in the Service with such stipends and allowances, including travelling and subsistence expenses, as he may deem necessary to procure the assistance of the most brilliant and promising research fellows from the United States and abroad;

(d) Make grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals for such research or research training projects as are recommended by the National Advisory Health Council, or, with respect to cancer, recommended by the National Advisory Cancer Council, or, with respect to mental health, recommended by the National Advisory Mental Health Council, or, with respect to heart diseases, recommended by the National Advisory Heart Council, or, with respect to dental diseases and conditions, recommended by the National Advisory Dental Research Council, and include in the grants for any such project grants of penicillin and other antibiotic compounds for use in such project; and make, upon recommendation of the National Advisory Health Council, grants-in-aid to public or nonprofit universities, hospitals, laboratories, and other institutions for the general support of their research and research training programs: PROVIDED, That such uniform percentage, not to exceed 15 per centum, as the Surgeon General may determine, of the amounts provided for grants for research or research training projects for any fiscal year through the appropriations for the National Institutes of Health may be transferred from such appropriations to a separate account to be available for such research and research training program grants-in-aid for such fiscal year;...

Traineeships for Professional Public Health Personnel

Appropriation

Section 306. (a) There are hereby authorized to be appropriated for the fiscal year ending June 30, 1957, and for each of the next twelve fiscal years, such sums as the Congress may determine, but not to exceed $4,500,000 for the fiscal year ending June 30, 1965, $7,000,000 for the fiscal year ending June 30, 1966, $8,000,000 for the Fiscal year ending June 30, 1967, $10,000,000 each for the fiscal year ending June 30, 1968 and the two succeeding fiscal years and $14,000,000 for the fiscal year ending June 30, 1971, $16,000,000 for the fiscal year ending June 30, 1972, and $18,000,000 for the fiscal year ending June 30, 1973, to cover the cost of traineeships for graduate or specialized training in public health for physicians, engineers, nurses, sanitarians, and other professional health personnel.

Project Grants for Graduate Training in Public Health

Appropriation

Section 309. (a) In order to enable the Surgeon General to make project grants to schools of public health and to other public or nonprofit institutions providing graduate or specialized training in public health, for the purpose of strengthening or expanding graduate or specialized public health training in such institutions, there are hereby authorized to be appropriated not to exceed $2,000,000 for each fiscal year in the period beginning July 1, 1960, and ending June 30, 1964, $2,500,000 for the fiscal year ending June 30, 1965, $4,000,000 for the fiscal year ending June 30, 1966, $5,000,000 for the fiscal year ending June 30, 1967, $7,000,000 for the fiscal year ending June 30, 1968, $9,000,000 for the fiscal year ending June 30, 1969, $8,500,000 for the fiscal year ending June 30, 1970, $14,000,000 for the fiscal year ending June 30, 1971, $15,000,000 for the fiscal year ending June 30, 1972, and $16,000,000 for the fiscal year ending June 30, 1973.

Grants to Schools of Public Health

Appropriation

Section 309. (c) There are also authorized to be appropriated $7,000,000 for the fiscal year ending June 30, 1970, $9,000,000 for the fiscal year ending June 30, 1971, $12,000,000 for the fiscal year ending June 30, 1972, and $15,000,000 for the fiscal year ending June 30, 1973, to enable the Surgeon General to make grants, under such terms and conditions as may be prescribed by regulations, for provision, in public or nonprofit private schools of public health accredited by a body or bodies recognized by the Surgeon General, of comprehensive professional training, specialized consultive services and technical assistance in the fields of public health and in the administration of State or local public health programs, except that (1) in allocating funds made available under this subsection among such schools of public health, the Surgeon General shall give primary consideration to the number of federally sponsored students attending each such school, and (2) for any fiscal year ending after June 30, 1968, such portions of the funds made available under this subsection as the Secretary may determine, but not exceeding one per centum thereof, shall be available to the Secretary for evaluation (directly or by grants or contracts) of the program authorized by this subsection.

Title IV - National Research Institutes

Part C - Dental Disease Research Training

Dental Auxiliary Utilization Training Grants

Grants for Continuing Education of Dentists and Training in Expanded Auxiliary Management

Appropriation

Section 422. In carrying out the purposes of section 301 with respect to dental diseases and conditions the Surgeon General, through the Institute and in cooperation with the National Advisory Dental Research Council (hereafter in this part referred to as the "Council"), shall--...(if) provide training and instruction and establish and maintain traineeships, in the Institute and elsewhere in matters relating to the diagnosis, prevention, and treatment of dental disease and conditions with such stipends and allowances (including travel and subsistence expenses) for trainees as he may deem necessary, the number of persons receiving such training and instruction, and the number of persons holding such traineeships, to be fixed by the Council, and, in addition, provide for such training, instruction, and traineeships through grants, upon recommendation of the Council, to public and other nonprofit institutions.

Part B - Training in the Allied Health Professions

Grants to Improve the Quality of Training for Allied Health Professions

Basic Improvement Grants

Appropriation

Section 721. (a) (1) There are authorized to be appropriated $15,000,000 for the fiscal year ending June 30, 1971, $15,000,000 for the fiscal year ending June 30, 1972, and $15,000,000 for the fiscal year ending June 30, 1973, for the basic improvement grants under this subsection.

Special Improvement Grants

Appropriation

Section 721. (b) There are authorized to be appropriated $15,000,000 for the fiscal year ending June 30, 1971, $20,000,000 for the fiscal year ending June 30, 1972, and $30,000,000 for the fiscal year ending June 30, 1973, for special improvement grants to assist training centers for allied health professions in projects for the provision, maintenance, or improvement of the specialized functions which the center serves.

Special Projects for Experimentation, Demonstration, and Institutional Improvement

Appropriation

Section 721. (c) (1) There are authorized to be appropriated $10,000,000 for the fiscal year ending June 30, 1971, $20,000,000 for the fiscal year ending June 30, 1972, and $30,000,000 for the fiscal year ending June 30, 1973 for grants and contracts for special projects under this subsection; (2) the Secretary is authorized, from sums available therefor from appropriations made under this subsection and subsection (b), to make grants to public or nonprofit private agencies, organizations, and institutions, for special projects related to training or retraining of allied health personnel, ...

Traineeships for Advanced Training of Allied Health Professions Personnel

Appropriation

Section 722. (a) There are authorized to be appropriated $1,500,000 for the fiscal year ending June 30, 1967, $2,500,000 for the fiscal year ending June 30, 1968; $3,500,000 for the fiscal year ending June 30, 1969, $5,000,000 for the fiscal year ending June 30, 1970; $8,000,000 for the fiscal year ending June 30, 1971; $10,000,000 for the fiscal year ending June 30, 1972; and $12,000,000 for the fiscal year ending June 30, 1973; to cover the cost of traineeships for the training of allied health professions personnel to teach health services technicians or in any of the allied health professions, to serve in any of such professions in administrative or supervisory capacities, or to serve in allied health professions specialties determined by the Surgeon General to require advanced training.

Explanation of Transfers

	1971	Purpose
Real transfer to:		
Departmental Management	-$98,000	To establish the Facilities Engineering and Construction Agency.
Real transfer from:		
National Institute of General Medical Sciences	+1,179,000	Proposed transfer for increased pay costs.
Comparative transfers to:		
Office of the Director	-51,000	Transfer of research contracting functions from NIH Management Fund to Office of the Director to establish the Office of Contracts and Grants.
National Institute of Dental Research	-401,000	Transfer of research and training grants from Division of Dental Health.
Comparative transfers from:		
Division of Biologics Standards	+295,000	To provide an equitable distribution of the Management Fund in 1972.
National Cancer Institute	+54,000	
National Heart & Lung Institute	+281,000	
National Institute of Allergy and Infectious Diseases	+103,000	
National Institute of Environmental Health Sciences	+274,000	Transfer of institutional support funds from NIH to Health Manpower.
National Cancer Institute	+2,416,000	
National Heart & Lung Institute	+4,051,000	
National Institute of Dental Research	+985,000	
National Institute of Arthritis and Metabolic Diseases	+3,597,000	
National Institute of Neurological Diseases and Stroke	+2,844,000	
National Institute of Allergy and Infectious Diseases	+1,642,000	
National Institute of General Medical Sciences	+5,361,000	
National Institute of Child Health and Human Development	+1,057,000	
National Eye Institute	+773,000	

Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
1962	$32,182,000	$32,182,000	$32,500,000	$32,500,000
1963	52,506,000	52,506,000	53,006,000	53,006,000
1964	92,677,000	62,270,000	62,270,000	62,270,000
1965	150,501,000	150,490,000	176,010,000	176,010,000
1966	154,502,000	154,502,000	154,982,000	154,982,000
1967	191,740,000	226,670,000	251,420,000	226,920,000
1968	408,413,000	402,163,000	417,913,000	402,663,000
1969	290,600,000	275,600,000	276,549,000	275,600,000
1970	355,374,965	355,209,965	423,453,965	372,658,965
1971	379,288,000	397,988,000	493,664,000	429,227,000 1/
1972	541,925,000			

1/ Includes $1,179,000 proposed transfer for increased pay costs.

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..............	745	$11,719,000	880	$14,338,000	+135	+$2,619,000
Other expenses.............	---	428,630,413	---	542,587,000	---	+113,956,587
Total..................	745	440,349,413	880	556,925,000	+135	+116,575,587

INTRODUCTION

The Bureau of Health Manpower Education is concerned with increasing the supply and improving the quality of the Nation's health manpower. To this end the Bureau supports programs of education, training and construction which not only produce workers in the fields of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, public health, and nursing, but which are designed to increase significantly the numbers of allied health professionals as well.

Through the programs included in this budget, the Bureau assesses the current and future health manpower supply and distribution requirements and serves as a national clearinghouse on all aspects of health manpower in the United States.

Bureau Reorganization and Budget Rearrangement

A new method in presenting the budget is herein proposed for fiscal year 1972 including for the first time in one appropriation account--"Health Manpower"--all program activities of the Bureau which heretofore had been arrayed over three distinct appropriations--"Health manpower", "Dental health", and "Construction of health educational, research, and library facilities".

The overriding reason for this change is to provide as far as possible a budget structure which is harmonious with program purpose, legislative authority, and organizational elements. In the past, major pieces of legislation have determined the direction of the Bureau's programs. These laws [1], are reflected in four budget activities: (1) Medical, dental, and related health professions; (2) Nursing; (3) Public health; (4) Allied health. The fifth budget acitivity, (5) Program direction and manpower analysis, covers those elements necessary to operation of the Bureau but not requiring significant health legislation.

In addition, the Bureau has recently completed a major reorganization along the lines of legislative authority, thusly (by budget activity): (1) Division of Physician and Health Professions Education and Division of Dental Health; (2) Division of Nursing; (3) and (4) Division of Allied Health Manpower; and (5) Division of Manpower Intelligence and the Office of the Bureau Director.

Within each of the budget activities, the justification describes the appropriate mechanisms and devices: Institutional support; Student assistance; Construction; and Educational grants and contracts, and direct operations.

We believe that explanation of the total "Health manpower" plan in one budget as outlined above will be more meaningful than before.

Proposed Legislation

The Health Manpower Act of 1968 expires on June 30, 1971, and several bills to extend this authority have been introduced and are now pending in the Congress. The new bill proposed by the Administration, introduced as H.R. 5614, H.R. 5767, and S. 1183, extends existing health professions educational assistance and nurse training authorities for three years but proposes significant improvements and changes. The 1972 budget is developed to implement the changes proposed in the Administration bill.

Changes are proposed to increase the level of financial assistance to health professions schools and other institutions training health personnel, i.e., a major change in capitation grants to schools of medicine, osteopathy, and dentistry. Changes are proposed for modification of student assistance programs, particularly for health professions and nursing loans and health professions scholarships with major emphasis being placed on Office of Education's guaranteed loans for new students. Construction programs are also being emphasized and expanded through a new program of interest subsidy and loan guarantee to private institutions.

Other major plans which will be funded in 1972 through this proposed legislation include a program to increase the number of physician assistants and a new program for health manpower educational initiatives. Through these educational initiative awards, area health education centers will be established which will utilize existing health centers for training of health personnel and should improve the distribution, supply or utilization of health personnel and encourage training for better delivery of personal health services through the use of the team approach.

Each of the major categories--Medical, dental, and related health professions; Nursing; Public health; Allied health; and Program direction and manpower analysis--are discussed in detail in the following pages.

---

[1] Includes the Health Professions Educational Assistance Act, the Nurse Training Act, and the Allied Health Professions Personnel Training Act.

Health Professions

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and and benefits..............	329	$4,974,000	382	$6,076,000	+53	+$1,102,000
Other expenses..............	---	318,606,838	---	427,969,000	---	+109,362,162
Total..................	329	323,580,838	382	434,045,000	+53	+110,464,162
Subactivities:						
Institutional Support.....	---	147,350,000	---	256,358,000	---	+109,008,000
Student Assistance........	---	40,500,000	---	47,637,000	---	+7,137,000
Construction..............	---	120,806,838	---	113,000,000	---	-7,806,838
Educational Grants and Contracts, and Direct Operations.......	329	14,924,000	382	17,050,000	+53	+2,126,000
Total................	329	323,580,838	382	434,045,000	+53	+110,464,162

General Statement

One of our national goals is to increase the availability of quality health services to all people. To achieve this goal, health manpower must be increased substantially and health institutions, especially those teaching the health professions must be strengthened.

The Nation's health requirements have increased in recent years. Some of the causes are growth in population and changes in age distribution; change in social attitudes toward health care; inadequate health services for the poor; and rising levels of education and recognition of the importance of health. These causes, and others, are increasing the demands for improved quality and availability of health services. In turn, this has increased the pressure on the schools to educate more high quality health professionals. The goal of more health services can be achieved only if adequate investment is made to expand health professions manpower resources.

The objective of the Bureau of Health Manpower Education, as related to health professions, is to alleviate shortages by assistance to institutions and to their students so that the school can graduate more health professionals. In 1972, assistance to institutions will be in four general categories:

Institutional Support--There are three types of grants in the proposed program of educational improvement:

Capitation Grants will be awarded to schools of medicine, osteopathy, and dentistry, primarily on the basis of the number of students graduated by the school. These Federal grants will help assure financial viability and should assist in reducing the numbers of schools in financial distress.

Special Project Grants supply assistance to health professions schools to: (1) Increase the supply of adequately trained personnel; (2) support efforts to improve curricula of health professions schools--(particularly shortening curricula); and (3) alleviate the problem of the schools in serious financial distress. Also these grants support the Physician and Dental Augmentation Programs, which provide incentives to medical and dental schools to increase enrollment.

Health Manpower Education Initiative Awards, a new program, for which $45,000,000 is requested in 1972, is a multifaceted, yet targeted attack on special health manpower education problems. The new program will help support health manpower training for developing area health education centers. Some activities to be supported are: Training of physician's assistants, extension of health professions training in sites remote from the health science center, residency training in family practice for physicians, and other projects designed to improve the quality, supply, utilization, and distribution of our health personnel.

Student Assistance--The expense of health professions education places a heavy financial burden upon the students and their families. Many highly motivated and qualified students cannot pursue a health professions career. The health professions student assistance programs of the Bureau will help students who have difficulties in financing their education. Scholarship aid is directed to qualified students of medicine, osteopathy, or dentistry from low income families; and increased Office of Education's guaranteed loans are to be available to assist all students who need financial aid.

Construction of Health Education, Research, and Library Facilities--Facilities are needed for new schools and many existing schools have inadequate facilities and with rising construction costs are finding it increasingly difficult to provide facilities without Federal assistance.

In 1972, under the proposed consolidated construction authority, schools of health professions, nursing, allied health and public health, as well as health research and library construction will be eligible for matching grants. In addition private institutions can be assisted by a new program of interest subsidies and guaranteed loans.

Educational Grants and Contracts, and Direct Operations--Awards from this program will be made to develop new techniques in health professions education such as the promotion of better auxiliary utilization; to shorten curricula; to study the distribution of available manpower; to determine the need for and condition of teaching facilities, and to evaluate the programs in health manpower. The objective is to discover, assess, develop, and test innovations which will assist institutions in their future educational programs. These operations will be carried out in both the Division of Physician and Health Professions Education and the Division of Dental Health.

Justification

It is only by assuring an adequate supply of well-trained health professionals that we can hope to overcome the critical shortages of health manpower. This is also necessary in order to provide the high quality medical care essential to meeting our national health needs. The 1972 funding levels have been developed with this need in mind.

Institutional Support	1971	1972	Increase or Decrease
Capitation grants..........	$46,800,000	$93,358,000	+$46,558,000
Special project grants.....	100,550,000	118,000,000	+17,450,000
Health manpower education initiative awards.........	---	45,000,000	+45,000,000
Total..................	147,350,000	256,358,000	+109,008,000

Capitation Grants--The request includes $93,358,000 to fund the formula of $6,000 per graduate in schools of medicine, osteopathy and dentistry. The capitation is on the graduate instead of enrollment in order to encourage greater output of health professionals in these disciplines, rather than to merely expand first-year enrollments and allow for changes in the pattern of medical education. The capitation, based strictly on graduates with no differential for the length of the training program, encourages and rewards schools that increase output and shorten their curriculum, i.e., in a three-year course of study, the schools receive $2,000 a year for the education of a student, while in a four-year course of study, they receive $1,500 a year per student. Awards will also be made to eligible schools which have not yet graduated a class. A three-year school will receive $2,000 per student in the first and second year classes; four-year schools will receive $1,500 per student in the first, second, and third year classes; and two-year schools will receive $1,500 per student.

Capitation dollars will be awarded to schools of medicine, dentistry, and osteopathy since these are the health professions which are in critically short supply.

Special Project Grants--These grants will supply broad-range assistance to schools of medicine, osteopathy, dentistry, optometry, podiatry, pharmacy, and veterinary medicine for programs designed to maintain or increase the supply of trained health personnel and accelerate and improve the educational process in the school.

Special project grant funds totalling $118,000,000 will be used primarily for enrollment increases and curriculum shortening. A decreasing level of support for health professions institutions in financial distress is requested on the assumption that the proposed capitation support will help ease the financial problems at such institutions.

Twenty-three million dollars is requested for graduate training. These funds have been transferred from the various research institutes of the National Institutes of Health, representing that portion of training grants for faculty support. The NIH has long had a program of assistance to schools for graduate training in the form of stipends, faculty support, and other associated costs. We are now consolidating part of this program with the existing institutional grants through the health professions assistance programs to give the school administration more discretion in the use of these funds.

Attached are tables which reflect the use of the health professions educational improvement grant funds in 1970 and estimated plans for 1971 and 1972.

Health Professions Educational Improvement Grants

PROGRAM SUMMARY

Type of School	Amounts 1970	Amounts 1971 a/	Amounts 1972 a/	Number of Participating Schools 1970	Number of Participating Schools 1971a/	Number of Participating Schools 1972a/
Formula:						
Medicine	$21,254,226	$21,400,000	$63,483,000	101	103	106
Osteopathy	1,126,798	1,100,000	2,800,000	6	6	6
Dentistry	9,204,031	9,200,000	27,075,000	51	53	55
Optometry	1,516,957	1,500,000	---	11	12	---
Pharmacy	10,196,494	10,200,000	---	70	74	---
Podiatry	694,553	700,000	----	5	5	---
Veterinary medicine	2,506,941	2,700,000	---	17	17	---
Subtotal	46,500,000	46,800,000	93,358,000	261	270	167
Special (project):						
Medicine	34,942,170	71,200,000	71,853,000	79	92	95
Osteopathy	2,050,420	2,000,000	2,592,000	6	7	7
Dentistry	12,961,689	20,300,000	21,258,000	35	41	42
Optometry	2,288,659	3,050,000	3,630,000	9	10	12
Pharmacy	267,500	1,000,000	12,660,000	2	5	74
Podiatry	1,007,438	1,000,000	1,500,000	5	5	5
Veterinary medicine	781,725	2,000,000	4,507,000	1	3	17
Subtotal	54,299,601	100,550,000	118,000,000	137	163	252
Cost Study Contract	600,399	---	---	---	---	---
Total	101,400,000	147,350,000	211,358,000			
(Authorization)	(117,000,000)	(168,000,000)				

a/ Estimate

Health Professions Educational Improvement Grants
Aid to Medical, Dental, and Related Health Professions Schools
(in millions of dollars)

	1970	1971	Change: 1971 over 1970	1972	Change: 1972 over 1971
1. Formula Grants					
MOD	31.6	31.7	+0.1	93.4	+61.7
OPPV	14.9	15.1	+0.2	0.0	-15.1[a/]
Subtotal, formula	46.5	46.8	+0.3	93.4	+46.6
2. Special (Project) Grants					
(a) Financial Distress					
New	6.0	27.8	+21.8	16.5	-11.3
Continuations	20.8	10.0	-10.8	8.2	-1.8
(b) Other Purposes (curriculum improvement, etc.)					
MOD					
New	13.8	15.0	+1.2	3.7	-11.3
Continuations	10.3	22.0	+11.7	48.6	+26.6
OPPV					
New	0.4	0.2	-0.2	15.4	+15.2
Continuations	3.0	2.6	-0.4	2.6	
(c) Graduate Training	0.0	23.0	+23.0	23.0	0.0
Subtotal, specials	(54.3)	(100.6)	+(46.3)	(118.0)	+(17.4)
3. Health Manpower Education Initiative Awards	0.0	0.0	0.0	45.0	+45.0
4. Cost Studies	0.6	0.0	-0.6	0.0	0.0
TOTAL	101.4	147.4	+46.0	256.4	+109.0

[a/] Support will shift to special project grants.

Health Manpower Education Initiative Awards--These new types of awards are designed to help alleviate deficiencies in the supply, distribution, quality and utilization of health manpower. The need for new approaches in solving the manpower problem has been recognized. The creation of a national network of area health educational centers, as recommended in the recent Carnegie Commission Report, and support of new and more effective types of health maintenance organizations, are examples of such new approaches. In fiscal year 1972, the program will focus on these activities by supporting the education and training aspects essential to their operation.

The budget provides for $45,000,000 to make awards in support of activities such as:

a. Area health education centers which will have as one of their primary objectives the organization of training where none presently exists. They will also serve to improve the supply, distribution and utilization of health manpower and will facilitate the training and retraining of health manpower.

b. Interdisciplinary training for team approaches in health care delivery.

c. Establishment and maintenance of programs for training health personnel in health manpower shortage areas.

d. Training programs to develop selected categories of paraprofessional health personnel such as physician assistants, dental therapists, and pediatric nurse practitioners. These programs could be carried out in the area health education centers.

e. Advanced medical training activities designed to improve the supply, distribution, or utilization of health care personnel in shortage categories (e.g., primary care physicians, especially in underserviced areas).

f. Training programs for teachers, administrators, or specialists for which there is a special need, as determined by the Secretary (e.g., primary health care personnel, medical care administrators, etc.).

In fiscal year 1972, plans call for major efforts to be devoted to planning and development of area health education centers. Only a few organizations exist in this country which can be considered more than rough prototypes of these centers. Establishment of these centers will require careful planning of the location, financial arrangements, organization, facility and personnel resources. By the end of the year we hope to have twenty centers identified and either in the early stages of operation or in the late planning stage, and an equal number at an earlier phase of planning. Because of the importance we attach to the creation of these centers, we are prepared to allocate as much as four-fifths of the funds available under this heading for the support of training to be conducted at such centers and training at other types of institutions for the same purposes. It is quite possible that some centers will evolve through our supporting initially only a few training activities in an institution until it is ready to become or be part of a fully developed center.

If we are to accept, as a National health goal, the enabling of all persons to benefit equally from our health care system, we must undertake a course of action that will attempt to fill in the present gaps in our system. There are many such gaps: geographic areas which are underserviced, both rural and urban; certain medical specialties, such as family practice; the use of paraprofessional personnel to supplement and extend the services of existing physicians, dentists, and nurses; and a shortage of training opportunities for those persons interested in careers in administrative aspects of health care. This award program, through its broad, flexible, noncategorical approach, is designed to provide incentives for alleviating such shortages.

Student Assistance	1971	1972	Increase or Decrease
Loans......................	$25,000,000	$18,750,000	-$6,250,000
Scholarships...............	15,500,000	28,887,000	+13,387,000
New program...............	(---)	(19,887,000)	
Existing program..........	(15,500,000)	(9,000,000)	
Total..................	40,500,000	47,637,000	+7,137,000

Financial aid to health professions students is essential if economically disadvantaged individuals are to become health practitioners. With the cost of health professions education continuing to rise, it is increasingly difficult for these students to finance their education without outside assistance.

This year we are proposing a special support program for medical and dental students, especially those from low income families. This involves modifying and nearly doubling our scholarship program and modifying existing loan programs, both in the Bureau and in the Office of Education. These changes are being made in order that no prospective health professions student be turned away for purely financial reasons.

	1971	1972	Increase or Decrease
Health professions student loans...........	$25,000,000	$18,750,000	-$6,250,000

To modify existing Federal student loan programs to better meet the needs of health professions students, the existing direct student loan program will be phased out over a period of several years beginning in 1972, and an expanded guaranteed loan program will be instituted through the Office of Education. This expanded Office of Education program will enable students to borrow a maximum of $5,000 per year, an increase of $2,500 per year over the existing health professions limit. In addition to this increased level of assistance, loans will be forgiven for borrowers who practice primary care in underserviced areas. This forgiveness policy has been established at a rate up to $5,000 per year. Also, loans will be cancelled for those medical, osteopathic, and dental students from low income or disadvantaged families who fail to complete their studies, and are in exceptionally needy circumstances. The proposed enabling legislation will change the authority of the Office of Education, enabling the Commissioner to guarantee loans and repay loans which have been forgiven or cancelled.

Students who have received direct loans under the health professions programs prior to fiscal year 1972 will continue to be eligible for these loans until they graduate. To assist these 16,300 eligible students, $18,750,000 has been requested for fiscal year 1972. In future years, the funds requested will be decreased as students graduate. New students will utilize the expanded Federally insured loan program.

	1971	1972	Increase or Decrease
Health professions scholarships.............	$15,500,000	$28,887,000	+$13,387,000
New programs (medicine, osteopathy, and dentistry).............	---	(19,887,000)	(+19,887,000)
Existing programs (all health professions).....	(15,500,000)	(9,000,000)	(-6,500,000)

A new scholarship program proposed to begin in fiscal year 1972 is intended to aid the economically disadvantaged students to enter the priority shortage health occupations of medicine, dentistry, and osteopathy. In fiscal year 1972, $19,887,000 will be utilized to promote this new program. These scholarships will aid students in their first two years of school. Under this new program, each school is entitled to receive an amount up to $3,000 per disadvantaged student. As many students will require more than this amount to finance their education, these students will also be eligible for support through the Office of Education's federally insured loan program. In the final two years it is anticipated that the students will obtain financing through the Office of Education's guaranteed loan programs. A feature of the new legislation will allow for forgiveness of these loans if the disadvantaged student cannot complete his studies.

Students of all disciplines currently being aided under the existing scholarship program will remain eligible for funds until they graduate.

The 1972 request also includes $9,000,000 to continue this existing program in order to provide scholarships to allow those students presently being assisted to complete their studies. The combined funds will provide assistance to over 30,436 students, or approximately 33 percent of the total enrollment of the participating schools as outlined on the following table.

HEALTH PROFESSIONS LOANS

	Number of Schools	Eligible Enrollments	Requested by the Schools	Allocated	Number of Students Assisted	Percent of Students Assisted	Authorization
Fiscal Year 1970							
Medicine and osteopathy....	106	38,773	$24,374,354	$8,894,862	11,869	30	
Dentistry.................	52	15,708	10,850,955	3,584,393	5,392	34	
Other health professions...	85	21,174	6,113,175	3,420,745	5,613	27	
Total...................	243	75,655	41,338,484	15,900,000[1]	22,874	30	$35,000,000
Fiscal Year 1971							
Medicine and osteopathy....	108	42,471	25,316,850	13,329,251	10,859	26	
Dentistry.................	52	16,311	10,691,357	5,534,604	4,077	25	
Other health professions...	92	25,648	7,435,273	6,136,145	7,506	29	
Total...................	252	84,430	43,443,480	25,000,000	22,442	26	35,000,000
Fiscal Year 1972							
Medicine and osteopathy....	108	31,853	18,987,637	9,937,500	8,144	25	
Dentistry.................	52	12,233	8,018,517	4,125,000	3,058	25	
Other health professions...	92	19,236	5,576,454	4,687,500	5,629	29	
Total...................	252[2]	63,322[2]	32,582,608[2]	18,750,000	16,831	27	xxx

[1] $900,000 from Revolving Fund included.

[2] Figures reflect fact that no students may be aided under this program in 1972 unless they had received assistance in 1971.

HEALTH PROFESSIONS SCHOLARSHIPS

	Number of Schools	Enrollment	Allocation	Number of Students Assisted	Percent of Students Assisted	Authorization
Fiscal Year 1970						
Medicine and osteopathy.........	107	39,542	$7,650,022	9,186	23	
Dentistry......................	53	16,121	3,164,945	4,087	25	
Other health professions........	108	27,396	4,725,681	6,503	24	
Total.......................	268	83,059	15,540,648	19,776	24	(Formula)
Fiscal Year 1971						
Medicine and osteopathy.........	108	42,471	7,525,062	8,430	20	
Dentistry......................	53	16,831	3,004,606	3,500	21	
Other health professions........	108	30,293	4,970,332	6,325	21	
Total.......................	269	89,595	15,500,000	18,255	20	(Formula)
Fiscal Year 1972						
Medicine and osteopathy.........	113	43,163		(18,504)	43	
New program..................			14,402,000	14,037		
Existing program.............			3,858,000	4,467		
Dentistry......................	55	16,981		(7,018)	41	
New program..................			5,485,000	5,346		
Existing program.............			1,392,000	1,672		
Other..........................	108	30,507				
New program..................			---	---		
Existing program.............			3,750,000	4,914	16	
Total.......................	276	90,651	28,887,000	30,436	33	
New.......................			19,887,000	19,383		
Existing..................			9,000,000	11,053		

Construction

	1971	1972	Increase or Decrease
	$120,806,838[1/]	$113,000,000	-$7,806,838

The relatively fixed capacity of existing teaching facilities restricts our ability to achieve enrollment increases in schools of the health professions.

In the past, there have been separate construction grant authorities for health professions, nursing, allied health, medical libraries, and health research facilities. The proposed legislation makes several improvements over the former authorities. First, all five of these construction programs will be administered through the proposed consolidated construction authority. Second, there is a provision to guarantee loans for private institutions. Third, interest subsidies not to exceed three percent may be made for these guaranteed loans. Colleges and universities will be able to expand, maintain, or renovate their physical facilities and to increase or maintain their enrollment capacity through the use of these types of support. This aid is essential when the program goals of these schools are being directed toward expansion of their facilities, to enable them to accommodate all qualified applicants seeking careers in the health professions.

As construction funds have provided for replacement of obsolete facilities, the educational environment has been improved so that quality education can take place. Improved facilities have stimulated innovative and varied teaching methods which, in turn, have improved the learning process.

Results of support provided under the health professions educational assistance construction program to the health professions schools from inception of the programs through December 31, 1971, are shown in the following table:

Type	Number of Schools Assisted	Amount of Awards	Number of New First-Year Places
Medical	72	$539,312,961	2,657
Dental	35	173,284,472	1,123
Osteopathy	3	8,951,321	23
Pharmacy	17	15,995,947	517
Optometry	5	5,097,365	157
Public health	7	19,294,251	465
Veterinary medicine	5	7,243,549	170
Nursing*	16	8,830,647	766
Podiatry	1	4,249,138	88
Total	161	782,259,651	5,966

* Funded prior to passage of the Nurse Training Act of 1964.

Similar statistics for other construction programs are as follows:

Type	Number of Schools Assisted	Amount of Awards	Number of New First-Year Places
Nursing	134	$83,085,152	5,850
Allied health	6	4,800,000	985
Medical library	11	11,250,000	---
Health research facilities	525	473,368,821	---
Total	676	572,503,973	6,835

[1/] Includes carryover from 1970 of $2,706,838 but does not include $8,232,575 for 1971 shown in the Nursing section of the budget.

By the end of fiscal year 1972, it is expected that 16 new medical schools and five new dental schools will admit students. This activity aided by health professions assistance grants will add 792 first-year medical places and 336 first-year dental places.

In the 78 nursing schools which have completed their construction projects, total nursing enrollments rose by about 3,300 students over the four-year period 1966-69, a thirty percent increase.

The budget request of $113,000,000 would be allocated as follows: $8,000,000 for the interest subsidies and $105,000,000 (made up of $90,000,000 in new funds and $15,000,000 in funds carried forward from 1971) in funds for matching construction grants. The loan guarantees and interest subsidies will be available to private schools in all eight health professions, schools of nursing, allied health training facilities, medical libraries, and health research facilities. Since these Federal guarantees, on which interest subsidy payments not to exceed three percent may be made, can cover no more than 90 percent of the cost of a facility; the $8,000,000 requested for interest subsidies will support $296,000,000 in construction projects. This subsidy will provide additional flexibility to the school which has had difficulty in obtaining matching funds.

Since this is a program not yet enacted, and applications for interest subsidies have not been received, it is not possible to estimate how these funds will be spread among the various eligible institutions.

The proposed matching grants program will permit grants of up to 67 percent of the costs of construction of public or private institutions. The costs eligible for support under the proposed legislation include the construction and equipping of new facilities, the acquisition of existing buildings, and the alterations, renovations and equipping of existing buildings. Interim facilities, sorely needed by schools to permit rapid enrollment increases, may also be supported while facilities of a more permanent nature are being planned and constructed.

This new approach to construction assistance--grants, guaranteed loans, and interest subsidies should make it possible to significantly increase construction in fiscal year 1972.

Educational Grants and Contracts, and Direct Operations	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Grants and contracts:						
Medical education.........	8	$837,000	12	$837,000	+4	---
Scientific education......	---	90,000	---	90,000	---	---
Dental education..........	24	982,000	17	922,000	-7	-$60,000
Dental fellowships........	10	150,000	15	150,000	+5	---
Dental auxiliary utilization--TEAM*...........	61	3,651,000	69	4,251,000	+8	+600,000
Dental research training..	6	386,000	6	386,000	---	---
Dental continuing education...............	5	200,000	5	200,000	---	---
Subtotal...............	114	6,296,000	124	6,836,000	+10	+540,000
Direct operations:	Pos.	Amount	Pos.	Amount	Pos.	Amount
Division of Physician and Health Professions Education...............	114	$3,297,000	164	$4,282,000	+50	+$985,000
Division of Dental Health.	215	5,331,000	218	5,932,000	+3	+601,000
Subtotal...............	329	8,628,000	382	10,214,000	+53	+1,586,000
Total................	---	14,924,000	---	17,050,000	---	+2,126,000

* Training in Expanded Auxiliary Management.

Educational grants and contracts are focused on innovation and experimentation in health professions education, including studies of the costs of education, facility needs, costs of new schools, and curricula changes. This program has attracted and supported projects from many outstanding individuals in medical education and other related disciplines.

Contract authority is now included as a means for promoting the greatest flexibility in accomplishing program goals. In 1972, we plan to fund those grants that were committed in previous years, and utilize the balance of the monies to fund contract activities whenever possible.

Medical Educational Grants and Contracts	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Noncompeting..............	6	$792,000	3	$220,000	-3	-$572,000
Competing renewals.........	---	---	1	200,000	+1	+200,000
Supplementals.............	---	---	1	50,000	+1	+50,000
New (grants or contracts)..	2	45,000	7	367,000	+5	+322,000
Total..................	8	837,000	12	837,000	+4	---

The medical educational grant and contract program in 1972 will fund about 12 projects. Attention is focused on educational innovations in medical and health-related schools. For example, investigations will be carried out to test computer-assisted and other forms of independent instruction for teaching medicine. Importance will continue to be given to new teaching methods which may result in a shorter period of academic preparation of physicians and related health professionals, improvement of their quality or both. Additional investigations being supported include: An investigation of the quality of the performance of the medical students, the results of which could aid curriculum and admission committees in reevaluating their policies, and a survey of existing and needed health professions educational facilities.

In fiscal year 1972, there will be some additional educational grant and contract awards which will continue the same general investigation as in fiscal year 1971. They will focus on improvement in the quality of health professions education and curricular innovations that offer the greatest potential methods to better utilize existing resources.

Scientific Evaluation	1971	1972	Increase or Decrease
	$90,000	$90,000	---

These funds are available for initial committee review of research construction grant applications including those submitted under the multipurpose provisions of the Health Manpower Act and for post review evaluation of projects previously awarded.

Dental Educational Grants and Contracts	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
New and renewals...........	6	$223,000	5	$185,000	-1	-$38,000
Noncompeting continuations.	18	759,000	12	737,000	-6	-22,000
Total..................	24	982,000	17	922,000	-7	-60,000

In fiscal year 1971 the dental educational grant and contract program supported 24 projects at universities and nonprofit organizations. These studies are designed to extend intramural programs relevant to the mission of the Division of Dental Health and to upgrade dental manpower to more effectively provide dental service and strengthen the dental care system for all persons. Four new projects were funded in fiscal year 1971. Support was also provided for the continuation of an educational research program involving curriculum revision and the development of instructional materials for dental students, an analysis of preventive dental behavior to provide a basis for new dental health education programs, and a study testing the feasibility of reassignment of certain dental tasks based upon the relationship of knowledge to task performance.

In fiscal year 1972 support will be given through a combination of grants and contracts for the continuation of 12 projects already underway, such as (1) an evaluation of a unique type of field training for dental students, (2) a study directed toward improvements in dental school teaching methods and (3) the preparation of a series of position papers on dental manpower and related subjects. In addition, two projects which were due to terminate concerning revisions of dental curricula and development of computer-aided instruction will be renewed.

Dental Fellowships	1971	1972	Increase or Decrease
New and renewal...........	$53,540	$60,932	+$7,392
Noncompeting continuations.	96,460	89,068	-7,392
Total..................	150,000	150,000	---

In fiscal year 1971, the appropriation of $150,000 supported the training of eight dental fellows pursuing advanced degrees in research specialties such as public health administration, education research, computer technology, bioengineering, epidemiology, medical sociology and psychology. In addition, awards have been made to two promising dental scientists in the research career development (RCP) program for preceptor-guided, independent research activities in the areas of medical care organization and dental education, respectively.

In order to honor continuation commitments, it will be necessary to partially fund three fellows; and approximately $27,000 of fiscal year 1972 funds will be used to fulfill these commitments.

In fiscal year 1972, support will be provided for continuation of the training of seven fellows. Remaining available funds will be used to admit five new fellows to the program with particular emphasis on providing advanced research training in the area of dental health delivery systems, dental economics, education, and health-related behavioral sciences.

Dental Auxiliary Utilization--Training in Expanded Auxiliary Management	1971	1972	Increase or Decrease
	$3,651,000	$4,251,000	+$600,000

The Nation's supply of dental manpower has been lagging behind the growth of the population for more than a third of a century. The program with the greatest potential for providing solutions to the dental manpower problem is that of expanding the productivity of the individual dentists through more effective utilization of auxiliaries. As a result of this program, approximately one-fourth of today's practicing profession has received training in the principles of "four-handed dentistry". The current dental auxiliary utilization program is designed to teach students, through formal classroom and clinical instruction, in the effective utilization of a chairside auxiliary. By reaching the dental student when his pattern of practice is still developing, the program produces a more productive practitioner. Through the proper use of chairside assistants, productivity can be increased by as much as 75 percent.

The present dental auxiliary utilization program underwent a major change in the latter part of fiscal year 1971. Financial support for the program through the dental auxiliary utilization grants will undergo gradual withdrawal and be redirected to a program which will provide to dental students training in expanded auxiliary management (TEAM). Schools will be encouraged to secure other means of supporting their dental auxiliary utilization programs.

With the body of knowledge developed at the Dental Manpower Development Center in Louisville, Kentucky, the Division of Dental Health is now promoting the team concept of clinical dentistry, and is ready to help prepare future dentists to deliver dental care under advanced delivery systems, including group practice. Savings gained by reduction in support of dental auxiliary utilization programs will be used to initiate the new competitive program known as TEAM. This new program will be an extramural extension of the experiment started at our Louisville project in 1963. Data derived from this project indicates that by delegating selected functions to a team of four assistants, the dentist can increase his productivity, while maintaining quality of service, by another 140 percent over what he can produce while working in a conventional "four-handed" manner with one assistant. A team consisting of three assistants and one dentist can increase productivity by 80 percent over what can be produced in the conventional manner. During the phase-out period of the DAU program, dental schools are being invited to submit applications for the new TEAM program. The $600,000 increase will support a minimum of eight high quality grants or contracts for teaching expanded functions and auxiliary management.

Dental Research Training Grants	1971	1972	Increase or Decrease
New and competing..........	$94,000	---	-$94,000
Noncompeting continuations.	292,000	$386,000	+94,000
Total..................	386,000	386,000	---

In fiscal year 1971, the research training grant program supported six active programs at degree-granting institutions. The $386,000 appropriation supported previous commitments in the areas of dental education research, socio-dental research and research in dental public health. Support was provided for the continuation of a program to train researchers in dental health education. A total of 32 full-time students participated directly in these programs.

In fiscal year 1972, research training programs will continue at the same level as 1971. The requested funds will be used to honor previous commitments for six programs. No funds will be available for competing renewals or for new starts.

Dental Continuing Education Grants	1971	1972	Increase or Decrease
New and competing..........	$80,000	$60,000	-$20,000
Noncompeting continuations.	120,000	140,000	+20,000
Total..................	200,000	200,000	---

Dental educators and practitioners have long pointed out the responsibility of the dentist to continue his education throughout his career. As the pace of research increases, the gap between research and application will become wider unless a corresponding effort is made in continuing education.

In fiscal year 1971 an appropriation of $200,000 supported five projects at the Universities of Iowa, California, Pittsburgh, Tufts, and Temple. In fiscal year 1972, the requested funds will support five projects and continue to place emphasis on the promotion and development of prototype continuing education systems which will offer wide applicability.

It is expected that these programs which have benefitted many tens of thousands of dentists to date will be a potent factor in bringing about the changes in dental practice which must come if headway is to be made to resolve the manpower shortage.

Direct Operations

Division of Physician and Health Professions Education

The new Division of Physician and Health Professions Education administers the Health Professions Educational Assistance Act except for dental curriculum research and development which will be a joint activity with the Division of Dental Health.

The Division administers grant and loan programs for institutional support, construction and student assistance, and provides advice and consultation to schools on: (1) financial assistance, (2) program evaluation, (3) educational development, and (4) teaching methods. In addition to the grant and loan support activities this Division administers contracts as an extension of its staff capability. One such contract which began in 1971 and extends into 1972 is for a facilities survey of health professions educational institutions. This survey will identify the facility needs of these institutions and help in proposing or devising effective plans and methods for increasing the output of health manpower. Ongoing staff studies include post construction assessment of facilities built with HPEA support. In applying for a construction grant, an institution certifies that the project will be completed in accordance with the grant application, and that the facility will be used over a period of time for those purposes specified in the project awards.

The new program increase of $751,000 in direct operations will be used primarily to support an additional 50 positions in the Division. Forty positions will be used to administer the new program of health manpower education initiative awards. This is a completely new program and will require a substantial amount of program planning, program direction, and analysis. A major segment of this program will be the establishment of area health education centers, as previously mentioned. These centers, located throughout the country will be in constant contact with both the Division and the area schools in order to most effectively develop the program, particularly with respect to the relationships of these centers to health maintenance organizations. These funds and positions are also requested for the physician assistants programs, which will function, in part, through special project grants to medical schools. Personnel such as public health advisors will be needed to help administer this program.

An increase of 10 positions in 1972 will be used for program coordinators who will work with an assigned set of university health educational centers. To accomplish their objectives, they will deal directly with the institutions in the initial phases of program planning and continue through program implementation and evaluation.

They will also assist institutions that are in dire financial straits; analyzing the options that are open to the school to readjust (e.g., reduce programs and/or program costs vs. increasing income appropriate to the requirement and source for each program), other compensatory devices, and how the financial problem can be finally resolved and prevented from recurring. They will all provide essential input for the policy decisions of the Bureau.

Division of Dental Health

The broad mission and ultimate purpose of the dental programs of the Department of Health, Education, and Welfare is to improve the dental health of the American people. The role of the Division of Dental Health, in helping the Department achieve this broad mission, can be divided into five program areas:

1. Increasing and improving the supply of manpower available to deliver dental services.
2. Increasing the efficiency and effectiveness of dentists and dental auxiliary production resources.
3. Increasing the productivity of dental manpower resources while assuring quality service.
4. Developing alternatives to minimize the need for dental manpower.
5. Facilitating the provision of high quality dental care for all segments of society.

Increasing and improving the supply of manpower available to deliver dental services--This mission is shared with other Divisions within the Bureau such as the Divisions of Physician and Health Professions Education and Allied Health.

The Division's role is: (a) To provide basic data regarding the number, type, and distribution of dental manpower now available and anticipated in the future; (b) to determine the current and future national and regional estimates of the need for expansion of facilities or construction of new facilities for production of manpower; and (c) to encourage the expansion of enrollment and construction of facilities to meet the estimated future need for manpower.

The Division is establishing this year an automated system for collecting and reporting current national and regional manpower data, including dentists and auxiliary personnel. This data system will lead to a documented workable model for estimating dental manpower requirements that will take into account the various factors affecting manpower needs.

The Division is utilizing contracts as a means for determining those factors that motivate minority groups and women to seek dental careers.

The Division conducts, supports and promotes studies related to the recruitment, selection, and development of dental and dental auxiliary students. Through these efforts, by the end of fiscal year 1971, considerable information will be available regarding the recruitment of increased numbers of women and Negroes to careers in dentistry. In addition to seeking to improve student recruitment, the Division seeks to ensure than an adequate supply of well qualified teachers is available and that teachers have opportunities to upgrade themselves and their instructional skills.

Increasing the efficiency and effectiveness of dentist and dental auxiliary production resources--This mission too is shared with other Bureau Divisions, especially the Divisions of Physician and Health Professions Education and Allied Health, primarily through the mechanism of institutional grants. The Division's role in this area in addition to focusing on student recruitment and selection, improving the quality of dental education, and assisting schools in equipping students to meet the problems of contemporary society is:

(a) to help improve dental and allied school's student selection process;
(b) to help school faculties identify appropriate educational and behavioral objectives and to review and revise curriculum accordingly;
(c) to conduct and stimulate research on the application of modern technology to the design.of curriculum and to learn how to achieve specified educational objectives more efficiently and effectively;
(d) to encourage and assist schools to eliminate courses and activities that do not contribute to the achievement of desired educational objectives as a means of compressing curriculum and decreasing time requirements for preparation of dentists and hygienists;
(e) to assist with curriculum establishment, modification and innovation to meet the educational requirements of present and newly developed or modified types of dental manpower; and
(f) to develop methods for training dental school faculty and predicting success of potential faculty.

The Dental Health Center in San Francisco provides the base of operations on educational research in addition to providing training to an expanding population of dentists and dental students, particularly in the areas of shortening and/or modifying the curricula of dental schools.

In fiscal year 1971, a series of seminars with deans of dental schools were completed, which anticipated that at least four dental schools would embark on a curriculum which would graduate students after three years. Educational objective requirements and model curriculum for training expanded function auxiliaries and for training dental students in using expanded auxiliaries, was completed and available to schools this year.

Increasing the productivity of dental manpower resources while assuring quality service--The Division's role in this area is: (a) To achieve maximum utilization of auxiliary personnel; (b) to achieve maximum delegation of functions to auxiliary personnel commensurate with quality service and without increasing cost of service; and (c) to achieve application of technology, materials and agents that bring about quality preventive and therapeutic services with the minimum use of professional manpower time and minimum cost.

The technique of four-handed dentistry was demonstrated at the 1971 November Convention of the American Dental Association and at ADA's 1972 mid-winter meetings in Chicago, reaching a potential audience of 1,000 dentists.

To attain Division goals in the area of dental productivity we will complete this year a task analysis of dental service delivery which can be used for future regrouping of functions and determining educational and skill requirements for dentists. This will enable the profession to upgrade education and the clinical practice of dentistry. By the fall of 1972 the Division seeks to have a minimum of ten dental assistant's schools preparing expanded function auxiliaries.

The Dental Manpower Development Center at Louisville and the Dental Health Center will be used to develop teaching aids for training expanded function auxiliaries to be used as a model in dental schools and dental assistants schools. Faculties of all dental schools will have had at least minimum training in the use and training of expanded function auxiliaries at the Louisville Center by the end of the year.

Developing alternatives to minimize the need for dental manpower--The most effective way to minimize the need for professional dental manpower is to maximize the use of disease preventive and therapeutic measures that can be applied by non-professional manpower. More specifically, the Division's role in this area is: (a) To achieve maximum application of tested disease prevention measures; (b) to develop or modify existing preventive measures so that their use requires a minimum of professional time; and (c) to develop and achieve maximum use of simplified therapeutic techniques and practices which can be delegated to auxiliary personnel.

There is currently no effective alternative to fluoridation for preventing tooth decay. Although the number of Americans drinking fluoridated water has increased to more than 80 million, over half are still denied its benefits. The Division continues to provide technical assistance to local organizations preparing for referendums and to states which are considering legislation related to fluoridation. In addition to expanding its promotional effort, the Division will undertake efforts to improve the surveillance of fluoridated water supplies to make certain that sufficient fluoride is in the water supplies to bring maximum benefit.

With the program increase of $395,000 and three positions requested in this budget the Division will be able to extend its activities to establish and maintain improved surveillance of public water supplies and institute school fluoridation programs in approximately thirty elementary schools. Using the contract mechanism, public water works personnel will be trained and programs established to maintain optimum fluoride levels in fluoridated water supplies.

In addition to an expanded effort in fluoridation, the Dental Health Center will offer, on a regular basis, training courses in such preventive practices as preventive periodontics for dental school faculty to provide the teaching community with the latest developments in methods for preventing periodontal disease.

Facilitating the provision of high quality dental care for all segments of society--The Division does not have prime responsibility for the delivery of dental care or for financing care, but can be instrumental in stimulating the development of dental care programs that can reach all segments of society. Thus, the Division's role primarily is to contribute to the development of programs and systems which are consistent with the present and expected dental manpower supply's ability to provide service and to the development of a manpower production scheme which is consistent with the delivery systems and programs being developed. The Division serves as a technical resource and provides consultation to developing and operating dental care programs. The Division also will attempt to formulate improved or entirely new mechanisms for care delivery, particularly for children's dental care programs.

Utilizing experience gained from its HEADSTART activities, the Division this year launched a program to determine cost-benefits of various components of comprehensive dental care programs for children as a basis for establishing treatment priorities.

Thus, during fiscal year 1972, the top priority activities for the Division of Dental Health will be those having to do with implementing the use of expanded function auxiliaries, including the training of the new auxiliary. An equal priority will focus on developing and organizing further the information that is known today about manpower, and the delivery of preventive and therapeutic services including information on relevant costs and benefits of services. Also one of the highest priorities this year will be the identification of the various tasks required to deliver dental preventive and therapeutic services, including an increased effort in the promotion, maintenance, and surveillance of fluoridation systems.

Nursing

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits	145	$2,415,700	153	$2,663,700	+8	+$248,000
Other expenses	---	71,092,875	---	64,336,300	---	-6,756,575
Total	145	73,508,575	153	67,000,000	+8	-6,508,575
Subactivities:						
Institutional Support	---	11,500,000	--	18,200,000	---	+6,700,000
Student Assistance	---	44,580,000	---	38,080,000	---	-6,500,000
Construction	---	8,232,575	---	---	---	-8,232,575
Educational Grants and Contracts, and Direct Operations	145	9,196,000	153	10,720,000	+8	+1,524,000
Total	145	73,508,575	153	67,000,000	+8	-6,508,575

The needs for nursing services across the Nation are increasing and changing faster than can be accommodated with the present workforce of nursing personnel. Advances in social concepts affirm the right of access to better health care for all the people. Nursing manpower needs are greater today than yesterday, and will be even greater tomorrow, because the population is growing, and particularly, the groups who have special health care needs (the very young, the aged, and the chronically ill) are increasing disproportionately. The needs are also greater because of advances against many of the diseases that afflict mankind. Progress in biomedical and mental health and other technological developments, is providing knowledge of the causes, course, and techniques for their control through cure and prevention. To implement takes more manpower!

Primarily, nursing care is focused on the patient and his needs. To meet these needs the modern nurse works in physicians' offices, homes, schools, industry, health centers, and extended care facilities, in addition to hospitals and other areas, and cares for families with an awareness of their special environment and problems. In hospitals, nurses work in intensive care units which require a level of knowledge and nursing skills that were in the research stage only a few years ago. The nurse has broadened her traditional role and is assuming new functions and levels of responsibility for the delivery of health care in collaboration with physicians. A Denver, Colorado, physician, who had not accepted a new patient for two years, was able to open his practice and increase his patient load by 35 percent as a result of adding a pediatric nurse practitioner to his staff. In Brookline, Massachusetts an obstetrician, because of adding a practicing nurse specialist to his staff, was able to extend his services to many more patients and broaden the prenatal and delivery care given. Similar results have been achieved by a family practitioner in a small community in Pennsylvania where the office nurse helped to extend the services of the physician into community and occupational health areas. These modern nurses are a part of the new and exciting practice of nursing that shares with the physician the challenges and satisfaction of medical practice.

Nursing care in this country is in the hands of about two million nursing personnel. Of this number, 700,000 are registered nurses, and the remainder are practical nurses, aides, and students in training as registered and practical nurses. Assessment of the nursing manpower resources, based on nursing needs and quality of nursing care required, has shown that of all the working nursing personnel available today, the registered nurses are those in shortest supply. Based on the present trend in the preparation of registered nurses from initial nursing educational programs, the 1980 registered nurse force will be about 947,000. It is clear that in order to reduce the shortage the rate of producing nurses will have to be expanded.

Another serious deficit is a shortage of nurses trained to take positions of leadership and specialization. Only about five percent (99,000) of all (2 million) nursing personnel are adequately prepared for positions requiring advanced specialized training such as teaching, administration and supervision of nursing teams and clinical specialties.

At the present time, nurses are predominantly a female professional group, and as such, confront particular problems of attrition, mobility, and recruitment, as well as those related to generally poor economic status and unsatisfactory working conditions of the nursing profession. Another problem facing the nursing profession in its efforts to improve its capability for providing better nursing care is the wide geographic variation in the distribution of nurses. This results in an intensification of the nursing shortage in some areas of the country.

An important trend that has been accelerating over a period of some years is an increase in numbers of the associate and bachelor's degree programs and a decrease in the number of hospital-based diploma programs. The movement to junior and senior colleges is a decision the students themselves are making. It seems likely that for a variety of reasons, including cost, societal expectations, and educational advantages, this trend will continue. Hospital schools will in some instances become degree-granting institutions in their own right and in other instances enter into inter-institutional arrangements with junior colleges or collegiate institutions so that the students will have use of clinical facilities and receive academic degrees.

Recruitment of nursing students is receiving increasing attention. The overall concept of recruitment is broadening to include helping potential students become qualified for entrance into nursing school, successfully completing the nursing program and graduating. It also includes drawing inactive nurses back to practice.

Important steps are being taken in continuing education and inservice education, as well as approaches to career mobility through awarding of educational credit based on assessment of an individual's proficiency and ability.

The Division of Nursing serves as a focal point in the Federal government for programs designed to increase the number of well trained registered nurses in practice and to improve the quality of care nurses give patients. It serves, in a sense, as a catalyst for collaborative efforts between the Federal government, State, and local communities for the improvement of nursing care. The Division continually assesses nursing needs and conducts a balanced program to improve education, practice, service, and research.

The future health of the Nation, and the quality of life of its people, will depend in large measure on the decisions made now. The future availability and expertise of nurses, who provide continuity for a patient's care, will be a critical factor in the successful operation of the health care system.

Institutional Support

Special Project Grants for Improvement of Nurse Training	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
New.....................	79	$4,944,000	51	$7,391,000	-28	+$2,447,000
Competing..............	6	306,000	8	400,000	+2	+94,000
Non-competing..........	114	6,000,000	174	10,109,000	+60	+4,109,000
Supplementals..........	(14)	250,000	(17)	300,000	(+3)	+50,000
Total.................	199	11,500,000	233	18,200,000	+34	+6,700,000

The special project grant program is providing the essential impetus for schools to initiate new methods in nursing education designed to improve the quality and increase the number of nurses available in the Nation. Those who are vitally interested in solving health manpower shortages and improving health services are greatly concerned with the most efficient utilization of the skills of physicians, nurses, and other professional health workers. New approaches to the delivery of health services are needed.

Over the past six years, awards were made for 232 projects to improvem utilization of faculty in all types of educational programs, demonstrate new or more effective methods of instruction, explore curriculum revision, establish new courses, discover new ways to increase enrollment, and assist schools of nursing in serious financial straits in meeting their cost of operation. An estimated 63,500 nursing students in 415 schools (directly and indirectly participating) have benefitted from this program.

Projects now underway are assisting some schools to increase enrollments by accommodating students on other campuses through television and by expanding and developing new clinical resources for teaching. In addition, funds are used to help meet costs in the following areas: planning, developing, or establishing new nursing programs; modifications of existing programs; assisting schools with special need for financial aid to meet accreditation requirements; assisting schools in serious financial straits to meet costs of operation; conducting research in nursing education; and assisting agencies, institutions, or organizations to meet the costs of projects that will help to increase the supply of adequately trained nursing personnel. Special project grants reflect planning on the part of communities and existing schools in the establishment of new nursing educational programs to meet their specific needs.

By virtue of their initial training, nurses have the knowledge based upon which advanced programs to expand and extend their capabilities can readily be built. Nurses can be prepared to expand the capacity of physicians to provide patient care by as much as 30 percent. However, the extent to which the availability of primary care services can be increased will depend upon the ability of existing training programs to expand.

The following are examples of how the modern nurse augments the physician's services and thereby assists him in providing more comprehensive care to larger numbers of people: A pediatric nurse practitioner, by assuming increased responsibility in child care can alleviate the shortage of pediatricians--her duties would encompass a wide range of preventive and therapeutic services; the nurse midwife will develop a specialized competence in maternal and infant care and expertise in the practice of midwifery; and the family health practitioner will be equipped with specialized knowledge and skills in physical diagnosis, clinical management, and community medicine so she may assume responsibilities of providing care to individuals and families in certain settings.

In 1972, the $7,391,000 shown for new projects includes $691,000 out of the 1971 base and $6,700,000 in new funds to support 40 new (nurse) "physician assistant" type projects designed to increase and augment patient care services through extending the capabilities of physicians by expanding the functions of the nurse. These grants are more costly since they provide for start-up costs of new specialized training programs and student support. Approximately 400 nurses will receive this training.

A special effort is being made to draw on heretofore untapped resources, such as returning military veterans and the culturally deprived. Minority groups are a source of nurse manpower which has scarcely been used, for educationally and socially deprived youngsters find it almost impossible to meet admission requirements to schools of nursing. Projects designed to identify boys and girls with motivation and potential for nursing, early enough to prepare them for admission to schools of nursing, and to provide the tutorial assistance they need to compete successfully with other students once they are admitted, serve the dual purpose of equipping the individual with professional preparation and increasing the number of nurses. The following are examples of special projects schools are currently conducting:

> A community college in Brooklyn, New York is providing necessary tutoring services to inner-city students to increase the rates of retention and help them successfully complete the nursing education program. All five associate degree programs in the New York City area are participating.
>
> A hospital school of nursing in Michigan is reorganizing the curriculum content to permit qualified licensed practical nurses to acquire advanced standing in a diploma program and complete the requirements in a shorter period of time.
>
> A college in Dallas, Texas admitted approximately 50 ex-corpsmen in the fall 1970 semester. The school will develop, implement, and evaluate a planned program of associate degree nursing for veterans with recognition of military corpsmen's training.
>
> At Many Farms, Arizona, a grant is helping the only college on an Indian reservation to establish an associate degree program in nursing. It supports "Project Hope" in a domestic endeavor to build health manpower and prepare people to help themselves. With this aid, Navajos will be able to prepare for practice as registered nurses without leaving their home community.

Special project grants for improvement of nurse training allows all schools of nursing to request funds, on a competitive basis, for support of projects designed to improve, strengthen or expand programs to teach nurses. Other health agencies and institutions are also eligible to apply for these funds to carry out projects to strengthen nursing. Most of these projects require from three to five years of support for completion. Those for developing new or modified programs, and those involving a number of schools and/or community agencies and communications equipment are especially costly, as compared with those for a single school. The number of applications for support are increasing as is the total cost per project.

Table number 1 contains statistical information on all nursing programs in the United States. Tables number 2 and 3 reflect fiscal data for special project grants.

Table Number 1

Nursing Statistics

	Diploma	Assoc. Degree	Bacc./ Graduate	Total
Total number of nursing programs:				
October 1967	767	281	287	1,335
October 1968	728	330	307	1,365
October 1969	695	390	330	1,415
Enrollments--All nursing programs:				
1967/68	84,413	20,936	48,806	154,155
1968/69	77,776	27,471	52,466	157,713
1969/70	72,798	34,537	56,518	163,853

Table Number 2

Special Project Grants

(Dollars in thousands)

	Diploma	Assoc. Degree	Bacc./ Graduate	Other Agencies	Total
FY 1971:					
Estimated awards	$2,215	$1,210	$7,635	$440	$11,500
Schools and agencies aided	44	21	108[a]	7	180[b]
FY 1972:					
Estimated awards	$2,225	$1,200	$12,600	$2,175	$18,200
Schools and agencies aided	42	20	134[a]	18	214[b]

a/ From 45 to 50 additional diploma and associate degree programs participate with and benefit from these grants.

b/ Estimated awards for 1971 are 199, for 1972 are 233. Some schools and agencies receive more than one award.

Table Number 3

Expenditures by Categories for Project Grants

Category	1969 Grants Amount	1969 Percent	1970 Grants Amount	1970 Percent
Faculty and other personnel	$2,888,000	72.2%	$5,167,000	73.8%
Consultants	152,000	3.8%	273,000	3.9%
Equipment	312,000	7.8%	308,000	4.4%
Renovations and alterations	74,000	1.9%	23,000	.3%
All other expenses	574,000	14.3%	1,229,000	17.6%
Total	4,000,000	100.0%	7,000,000	100.0

Student Assistance	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Loans.....................	---	$17,110,000	---	$9,610,000	---	-$7,500,000
Scholarships..............	---	17,000,000	---	17,000,000	---	---
Traineeships..............	---	10,470,000	---	11,470,000	---	+1,000,000
Total..................	---	44,580,000	---	38,080,000	---	-6,500,000

	1971 Estimate	1972 Estimate	Increase or Decrease
Nursing student loans....	$17,110,000	$9,610,000	-$7,500,000

There are more than 176,000 students enrolled in over 1,400 programs of nursing education leading to a diploma, associate degree, baccalaureate degree, or graduate degree that are eligible to apply for assistance under the nursing student loan program. Applications for fiscal year 1971 funds were received from 943 nursing programs reporting enrollments totalling 144,600 students.

The decreased nursing student loan budget request in 1972 and those for subsequent years will be for diminishing amounts to reflect the gradual phasing-out of this program as it is constituted in 1971. In 1972 there will be a greater emphasis on the use of Office of Education guaranteed loans for new students and for students from more affluent families. By 1975, it will be fully converted to a guaranteed loan program to be administered by the Office of Education. The amount of the maximum loan will be increased from $1,500 to $2,500. During the conversion process, those students who received loans in 1971 and prior years will be able to continue and complete their education under the provisions of the existing direct loan program.

Principal and interest on direct loans are repayable over a ten-year period. Up to 50 percent of the total loan and interest may be cancelled for each year of full-time employment as a professional nurse in a public or nonprogit institution or agency. Up to 100 percent may be cancelled when the borrower is employed full time in a public or non-profit private hospital in any area the Secretary (DHEW) determines has a substantial shortage of professional nurses. These forgiveness provisions will be further modified under pending legislation to provide even more liberal forgiveness of up to twenty-five percent per year per student if the nurse practices in a designated shortage area.

In 1971, requests from nursing schools for student loan support totalled $27,600,000. The $17,110,000 appropriation provided 62 percent of the school's request and will assist approximately 24,000 students. The budget request for $9,610,000 in 1972 will assist those (about 13,700 loans) students in need of financial aid who previously borrowed funds under the old loan program to continue their course of study in nursing. All other nursing students may apply to their local participating lending institutions for financial assistance through the guaranteed loan program of the Office of Education.

	1971 Estimate	1972 Estimate	Increase or Decrease
Nurse scholarships.......	$17,000,000	$17,000,000	---

Special efforts must be made to reach minority and other disadvantaged groups who are capable of but are not now entering the nursing field in sufficient numbers. Nursing scholarships will encourage and assist qualified young people with serious financial need to undertake education for nursing. Experience has shown the great need for additional financial assistance to students in the form of scholarships as well as loan funds since the majority of all nursing students come from families with annual incomes below $10,000--32 percent of all nursing students (over 52,000 potential nurses) come from families with incomes of less than $8,000.

The nursing scholarship program replaced the nursing educational opportunity grants program in 1970. In the first year of operation applications for scholarship funds were received from 677 schools to assist students of exceptional financial need. In 1971, applications were received from 918 schools. In 1972, it is estimated that 1,050 nursing programs will participate. This represents a 50 percent increase since 1970.

The request for $17,000,000 in 1972 will provide continuing assistance to schools first assisted under this program and for new schools who have expressed a need for such assistance. Approximately 17,000 nursing students of exceptional financial need will be assisted in the academic year 1971/72, the same number as were assisted in the previous year.

Nursing Scholarships--Statistical Summary

	ALL Schools of Nursing		Participating Programs ONLY	
	1971 Estimate	1972 Estimate	1971 Estimate	1972 Estimate
No. of Nursing Programs:				
Diploma..................	660	630	314	375
Associate Degree..........	425	460	320	375
Baccalaureate Degree......	260	265	255	260
Graduate Degree...........	74	75	29	40
Total..................	1,419	1,430	918	1,050
Enrollments................	166,745	181,000	140,880	157,500
Percent of students assisted	10%	9%	12%	11%

	1971 Estimate	1972 Estimate	Increase or Decrease
Professional traineeships.	$10,470,000	$11,470,000	+$1,000,000

At present, one of the most serious constraints in increasing the number of nurses in practice is the faculty shortage in nursing schools. Without adequate faculty, public and private expenditures for recruitment, construction, and financial assistance to schools of nursing are not efficiently used. In 1968, 27,800 registered nurses were employed by nursing educational programs in the United States. One-fourth of them were not prepared to teach nursing; they did not even hold the credentials deemed necessary for teachers in public elementary schools. The sharp increase in demand for education and a shortage of qualified teachers in recent years, has led to the hiring of nurse faculty with less than the desired level of preparation. In 1968, there were 1,317 budgeted full-time nurse faculty vacancies. This figure does not include vacancies for administrators in nursing education nor faculty in cooperating clinical agencies (hospitals, public health departments, etc.). Lack of prepared faculty to fill the positions in existing schools and those in new schools that are being established causes an acute problem at a time when greater numbers must be taught. Substantial increases in enrollment and development of new programs are dependent upon the increase in numbers of teachers for all types of educational programs.

The demand for these specialists continues to grow and the gap between the supply and demand is increasing. In 1970, approximately 179,000 of the 700,000 registered nurses in active practice were employed in leadership positions. Only about 42 percent of these 179,000 nurses have had the opportunity to adequately prepare for their jobs.

During this same period of time the number of practical nurses and auxiliary nursing personnel, the groups supervised by the registered nurse, has increased by over 500,000. Adequate leadership to plan, supervise, and direct aides and personnel with technical training for nursing services is essential for better utilization of all personnel. High priority must be given to the advanced preparation of nurses to provide this kind of leadership in all settings. This will result in more effective organization and delivery of health services of high quality.

The increasing specialization in medical practice requires more nurse specialists in the clinical areas. The practice of nursing is becoming more complex and requires a higher level of nursing skills and academic preparation to staff the growing number of specialized service units, such as coronary care, intensive care units, geriatric and home care services.

The $11,470,000 requested in 1972 will provide approximately 2,205 long-term traineeships, an increase of 205 over 1971, to registered nurses enrolled in advanced nursing programs. In addition, 1,900 nurses will receive short-term intensive training.

Construction	1971 Estimate	1972 Estimate	Increase or Decrease
Budget Authority..........	$8,000,000[a/]	---	-$8,000,000
Carryover.................	232,575	---	-232,575
Total obligations.....	$8,232,575	---	-$8,232,575

The shortage of nurses in the Nation continues to be critical. The 1980 total need is approximately 1.1 million nurses. To meet the 1980 goal, 50,900 additional new first-year places still need to be created.

The Nurse Training Act of 1964 (P.L. 88-581) authorized a program of matching grants to eligible schools. Federal support for the construction of nursing educational facilities is relatively new in this country; federal assistance first began in the mid sixties. From September 1965 (effective date of enabling legislation) to June 30, 1970, 243 applications were received. Approximately $80,000,000 in Federal funds were awarded to 132 schools for 134 construction projects. The total construction cost is approximately $141 million. Of the 132 schools receiving grant awards, 35 were new. Upon completion of construction the 134 projects will create 5,677 new first-year places and about 18,100 places will be maintained. The Health Manpower Act of 1968 extended the nursing school construction program for two years, through fiscal year 1971. The amounts authorized were $25,000,000 for 1970 and $35,000,000 for 1971. New legislation for 1972 and future years is pending.

[a/] Excludes $1,500,000 appropriated in 1971 and reserved for use in 1972.

The $8,000,000 awarded in 1971 will provide for an additional 500 first-year places and maintenance of 1,500 existing student places, which will result in an increase of less than one percent in the national inventory of first-year places.

In accordance with the President's (1971) Health Message, the construction program for nursing educational facilities will be consolidated with other like programs into a single broad construction grant authority which will be administered by the Bureau of Health Manpower Education and is justified in the "Health professions" section of this budget.

Educational grants and contracts and direct operations:

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Grants and contracts:						
Educational.............	---	$2,455,000	---	$2,455,000	---	---
Fellowships.............	---	650,000	---	650,000	---	---
Research training........	---	700,000	---	700,000	---	---
Subtotal...............	---	3,805,000	---	3,805,000	---	---
Direct operations.........	145	5,391,000	153	6,915,000	+8	+$1,524,000
Total.................	145	$9,196,000	153	$10,720,000	+8	+$1,524,000

Educational Grants and Contracts

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Non-competing..............	19	$1,235,000	39	$2,125,000	+20	+$890,000
Competing renewals.........	12	455,000	2	105,000	-10	-350,000
Supplementals..............	(6)	165,000	(9)	225,000	(+3)	+60,000
New.......................	12	600,000	--	---	-12	-600,000
Total....................	43	$2,455,000	41	$2,455,000	-2	-0-

Studies (supported by the Division of Nursing) have already documented the fact that nursing contributes significantly to the ability of the patient and his family to solve problems related to achieving health, both in the hospital and in the home. Much more needs to be known about the scientific basis of nursing practice so that nurses can know which actions are effective in given sets of circumstances. Answers to these questions come through research into the effects of nursing care on patient welfare. Findings from scientific inquiry are then incorporated in programs of nurse training at all levels so that patients can benefit as soon as possible from the new knowledge.

There is also mounting evidence that the nurse can substantially augment physician's services by taking on responsibilities that were once his sole prerogative. One nursing educational grant has demonstrated that the professional nurse can serve as the primary source of care for large numbers of adult chronically ill ambulatory patients, heretofore exclusively a function of physicians. Another project has shown that professional nurses, given additional experience and training in pediatrics, can relieve the pediatrician of up to 60 percent of his present activities thus allowing better utilization of his diagnostic-therapeutic and preventive expertise. Several grants are providing for investigation into a variety of hospital settings which impede or facilitate the professional nurse in the use of her professional skills and knowledge. (These studies are of particular importance in the modification and development of nurse educational and training programs.)

Practicing nurses and nursing students must learn and know how to apply the results of research in all health service settings. Developments in physiology and pharmacology and other scientific medical disciplines can affect nursing care substantially and must be incorporated into nursing practice and nursing education. The need for more research into all aspects of nursing practice and education and the communication of research findings can best be summed up by quoting a conclusion reached by the National Commission for the Study of Nursing and Nursing Education (Feb. 1970).

> "In the long run, we firmly believe that only through careful research can we begin to find the key ingredients to improved nursing practice. Only as our search becomes more rigorous and scientific can we hope to understand, predict, and control the results of nursing intervention. A corollary to this approach is the need to develop the capabilities for research and for optimum nursing practice through the enhancement of the educational system. To do this requires capital investment of money, people, and facilities. In the long run, we believe that the combination of research, educational, and financial support will ensure quality nursing for all our people."

The $2,455,000 for 1972, the same level of funding as in 1971, will support, through grants or contracts, approximately 41 projects.

Educational Grants and Contracts--Program Analysis

	1971 Estimate	1972 Estimate
Improving Nursing Practice and Service.....	$1,094,000	$1,094,000
Manpower Utilization and Recruitment.......	42,000	42,000
Strengthen Nursing Research Capacity in Nation..................................	1,039,000	1,039,000
Communication of Research Results..........	280,000	280,000
Totals................................	$2,455,000	$2,455,000

	1971 Estimate	1972 Estimate	Increase or Decrease
Nurse Fellowships........	$650,000	$650,000	---

In addition to applying existing knowledge for the improvement of patient care and the delivery of health services, new knowledge must constantly be generated to keep pace with advances in science and in medicine. Through special fellowships in nursing research, nurses are prepared to do independent research, to collaborate in interdisciplinary research and/or to stimulate and guide research of importance to nursing. Fellowships are an essential adjunct to the research grant program since they are the major source of support for individuals who have demonstrated potential and can undertake full-time graduate study in the physical, biological or behavioral sciences.

There is a growing demand for nurses prepared in research methods and experience in carrying out research to direct projects, to work as part of medical research teams, and to direct community health research. Approximately 123 fellows will be supported with the requested $650,000 for 1972.

Nurse Fellowships Program Analysis

Fields	1971 Estimate	1972 Estimate
Behavioral sciences	$340,000	$340,000
Education	116,000	116,000
Biological Sciences	82,000	82,000
Nursing	102,000	102,000
Physical Sciences	10,000	10,000
Total Fellowships	650,000	650,000

Research Training Grants

	1971 Estimate		1972 Estimate		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Non-competing	8	$601,000	7	$700,000	-1	+$99,000
Competing	1	99,000	-	---	-1	-99,000
Supplementals	-	---	-	---	--	---
New	-	---	-	---	--	---
Total	9	$700,000	7	$700,000	-2	-0-

More nurses must be prepared in depth in clinical nursing and in the biological, physical and behavioral sciences and in research methods to design and carry out projects to improve nursing care and practice and collaborate in the increasing amount of multidisciplinary research. Colleges and universities need increased financial support in order to strengthen and expand their doctoral programs in the basic sciences and to make training opportunities available to nurses in these highly competitive fields. Research training grants provide this institutional support as well as stipends for nurses who are studying full-time toward doctoral degrees.

Nurse scientist training grants are currently assisting 9 universities in providing nurses with graduate education in 35 departments of the universities. These nurses strengthen the base of nursing science and bring this knowledge to studies for improving nursing service. The following universities participated in this program in 1970. No new schools will be added in 1971.

Schools Participating--FY 1970

University of Pittsburgh
University of Kansas
Boston University
Columbia University

University of Arizona
University of Washington
University of Illinois
Case Western Reserve
University of Colorado

The Nurse Scientist Graduate Training Grants Program advances nursing and other health-related research by increasing the number of nurses who have special training in the sciences basic to health care. Funds requested in the amount of $700,000 in 1972 are required for the continued support of grants begun in prior years.

Direct Operations

A major problem confronting the Nation is how to provide adequate nursing services to meet its needs. Nursing is pivotal to all health programs; if nursing manpower is lacking or limited in quantity and quality, the services patients receive will be correspondingly inadequate. The Division's programs represent a total commitment to the long-range goals of an adequate supply of properly trained nurses, equitably distributed and readily accessible throughout the country. These programs are carried out through research and technical assistance, education and training, studies of manpower resources, programs of refresher training and continuing education and recruitment.

Program Plans for 1971 and 1972

Research and Technical Assistance

Nursing practice must be studied and improved if nursing services are to be adequate for the needs of modern health programs. A major activity of the Division is the provision of technical assistance and consultation to nursing schools, hospitals, homes, health agencies, and other institutions to strengthen nursing practice, to improve the delivery and evaluation of nursing services, and to improve the preparation and utilization of nursing personnel. Information collected from studies is utilized to assign or reassign tasks to personnel according to their preparation and experience so that the scarce professional nurse manpower can be used for maximum effectiveness in the delivery of nursing services. Opportunity for professional nurses to use their special knowledge and skill in practicing their own discipline and to collaborate appropriately with physicians in health care for individuals has not kept pace with the health needs for our society and with the prevention of illness. Inadequate utilization of professional skills dilutes the quality of health services and the care which patients receive. It is costly.

The gap between supply of nurses and the demand for their services can never be reconciled through numbers alone; the professional competencies of each practitioner must be used to the best possible advantage in all settings. Discriminating utilization of professional talent not only bridges the numerical gap between supply and demand, but also promotes job satisfaction which encourages young people to enter nursing and also encourages nurses to remain active in their profession.

A program increase of $200,000 will provide resources within the regional offices to meet some of the specific needs of state and local jurisdictions as contrasted with programs which are national in scope. Examples include surveys of state needs and resources and studies designed to develop the most effective use of nurse manpower in home health agencies. Approximately three or four contracts will be supported.

Education and Training

The goals of the Division in this area are: to improve the quality of nursing education to ensure that nursing personnel can meet the demands of modern technological development in the health sciences; to identify the content of nursing education programs which can be presented by new methods and techniques; to ensure the soundness of nursing education development by basic planning; and to increase the supply of qualified applicants to and graduates from all types of nursing programs. The provisions of the Health Manpower Act of 1968 are the principal means of accomplishment of these goals.

Consultation and technical assistance for nursing education and training to schools of nursing, hospitals and health agencies will be increased in 1971 to ensure the efficient use of construction, student assistance and institutional support grant monies authorized in the Health Manpower Act of 1968. It is particularly important to provide consultation and technical assistance to educators in associate degree, diploma and baccalaureate programs to bring about needed changes in educational programs, to assist in the creation and development of new programs and the construction and/or renovation of nursing schools.

A most important new area of concentration in 1972 will be the support of (Nurse)-"Physician Assistant" type programs to expand and extend the role of the nurse. An increase of five positions and $87,000 is requested to staff this activity which will administer these new projects.

Manpower Resources

Nursing manpower is a national resource. It is a key component of all types of health care programs. Needs for nursing personnel and facilities to educate nurses vary widely from one section of the country to the other; therefore, it is imperative that resources be identified at local, State and regional levels. The Division is developing and refining tools for the assessment of nursing needs and resources and is furnishing consultation to groups engaged in this kind of planning.

Nursing is a complex subject for manpower analysis because of the sheer numbers involved, the various (four) types of educational programs preparing registered and practical nurses, the variety of institutions and agencies in which nurses are employed, and the mobility patterns of this group. Of an estimated 3 million health workers in the United States more than half are nursing personnel. Of an estimated 1.9 million nursing personnel--registered nurses, licensed practical nurses, and nursing aides--slightly more than one-third are registered nurses. Little is known about the estimated 800,000 para-nursing personnel (nurses' aides, nursing assistants, orderlies, attendants, home health aides, etc.) working with professional and practical nurses. It is imperative that information about this group be collected and analyzed in order to develop guidelines for their training and utilization.

The Division of Nursing, through its manpower activities maintains a perspective on nursing nationwide--the adequacy, quality, distribution, training and utilization of personnel. The Division has developed and supported a career-patterns study which has determined factors that cause attrition from the nurse supply through an increased understanding of the characteristics of those students who complete nursing programs and those who do not, and the career patterns of graduates. Analysis made of data from a Division-supported Inventory of Registered Nurses showed a work life of 24.3 years for all registered nurses. This is an increase of nearly five years over the past 20 years. By comparison, the work-life expectancy for all women is approximately twenty years.

Other manpower activities undertaken include an inventory of practical nurses; an estimate of the financial ability of students and schools to sustain the needed growth in the supply of nurses; and a contract designed to improve the utilization of nurses through the development of computerized nursing assessment forms which will provide patient care information vital to making nursing decisions.

These studies and surveys conducted by the Division provide the facts and figures for a continuing overview, and the basis for program direction and future projections of nursing manpower needs.

Refresher Training and Continuing Education

The shortage of nurse manpower in this country has been frequently documented by the press. The latest Inventory of Registered Nurses compiled by the American Nurses' Association, showed that more than 285,000 inactive nurses maintained a current license to practice. Approximately 300,000 who have been trained as nurses have not maintained current licenses.

To reduce attrition from the work force, increasing numbers of inactive nurse must be returned to active practice each year. The current annual attrition rate is estimated as averaging three percent (of the active nurse supply) and reflects both the separation and returns to active status. The Division of Nursing is working with State coordinators to reduce the net attrition rate and to promote the return to service of inactive nurses. In 1967, the Division of Nursing launched a program to support the effort to attract inactive nurses back into practice. A plan was developed providing for a nurse coordinator in each State, promotional material to recruit inactive nurses through national and local efforts, and development of teaching materials for refresher courses. The Division's experience with this retraining endeavor has shown that participants in refresher courses are from 25 to 60 years old and have had periods of inactivity ranging from three to 25 years. It also affirms that the more recent graduates need less in theoretical content and clinical experience than nurses who are having their first introduction to modern technologies and recent medical advances.

Although shortages are nationwide, the solution lies in the local settings where these nurses live and where the actual need for patient care exists. The Division fosters the development of other refresher training and continuing education programs under local sponsorship and encourages the adoption of flexible working schedules and other incentives by employers. All of these will help nurses keep their skills up-to-date and attract back to practice those nurses who are inactive.

All health professions recognize continuing education is intrinsic to individual effectiveness in practice. Increasing complexities of nursing practice in emerging new systems of health care require a constant updating of knowledge. Continuing education differs from refresher courses for nurses who wish to resume practice after a period of professional inactivity. It is education designed to keep active nurses up-to-date in nursing and to enrich their practice. It's value lies in improved patient care.

A program increase of $1,054,000 and three positions in 1972 will make it possible for fifteen more States to initiate and carry out programs (through contracts) designed to increase the nursing work force. About twenty states are cooperating in this effort. Local nurse coordinators will assist with the identification, contact and follow-up of inactive professional nurses; they will identify employment opportunities in various health care facilities; and promote new and/or expand existing training programs for inactive nurses, and assist in developing flexible modular curricula for inactive nurses. The coordinator will also promote community efforts to retain nurses in practice by helping them to make suitable arrangements for transportation and for the care of young children.

Recruitment

A major thrust at present is an attempt to broaden the base of potential recruits into nursing through recruitment efforts directed to minority groups, disadvantaged youth, men and others, who have not formerly considered nursing as a career.

Education beyond high school is not a realistic goal for groups of people with low and moderate incomes. For these individuals, education is the way to enhance their self-image and raise their socio-economic levels. To recruit successfully from this group, schools of nursing must develop programs flexible enough to adapt to students who learn with difficulty because of inadequate elementary and high school education. Imaginative ways to interest these young people in nursing, early counseling, remedial and tutorial work that begins in high school and continues throughout the nursing curriculum, all will help to increase the numbers of practicing nurses.

The Division will continue to emphasize recruitment of minority and disadvantaged youth into schools of nursing. Through contracts, effective relationships have been developed to encourage this target group--Mexican-American, Black, inner city youth--to complete secondary school and to enter a school of nursing. Contracts have been developed to reach a school population of over 15,000 in six geographic areas: Los Angeles, Portland (Oregon), Cleveland, Milwaukee, New York City, and Washington, D.C. Students who might otherwise be lost to nursing will have an opportunity to matriculate in a nursing education program. In Cleveland, for example, an effort is being made to seek out and identify disadvantaged inner-city high school students and recent graduates with an interest in nursing. "Make it in Nursing" is the theme used to publicize the program. Within a six-month period, thirteen high schools and twenty-six nursing schools have become involved in this project; several hundred candidates have been assisted.

Nursing must compete with other professions and occupations to attract and retain bright and able people. The task is especially difficult because of the increasing attractiveness of competing occupations and professions open to women. The percentage of female high school graduates entering schools of nursing decreased from 4.9 percent in 1965 to 4.6 percent in 1969.

Female High School Graduates Admitted to Nursing

Year	Admissions to Nursing Schools	Percent of Female High School Graduates
1965	57,180	4.9%
1966	60,191	4.5%
1967	58,021	4.4%
1968	60,673	4.5%
1969	64,157	4.6%

Adequate and accurate information regarding nursing as a career is not reaching potential recruits in many secondary schools throughout the country. Guidance counselors and school officials must be made aware of the opportunities for students in the various types of nursing programs and of the financial assistance programs which are available.

Public Health

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits	24	$332,000	24	$371,000	---	+$39,000
Other expenses	---	18,169,000	---	18,173,000	---	+4,000
Total	24	18,501,000	24	18,544,000	---	+43,000
Subactivities:						
Institutional Support	---	9,571,000	---	9,571,000	---	---
Student Assistance	---	8,400,000	---	8,400,000	---	---
Direct Operations	24	530,000	24	573,000	---	+43,000
Total	24	18,501,000	24	18,544,000	---	+43,000

Revolutionary changes are taking place in the concepts of services to maintain and protect the health of people in the aggregate. These are related to the changing concentrations and size of the population, the increasing health problems associated with urbanization and industrialization as well as those in agriculture, the remarkable advances that have occurred in medical and scientific knowledge and technology, and the increasing concern of the public with matters of health and the services provided for the maintenance of health and the care and cure of those who are ill.

These changes are, in turn, creating new needs for a wide variety of professional personnel in agencies, both public and private, charged with the responsibility for the delivery of these health services. In addition to requiring greatly increased numbers of recognized types of public health personnel, new types of personnel such as health services administrators and community health planners are urgently needed in large and growing numbers in health and related agencies across the country. As more and more programs are implemented, staffing problems will become progressively more severe. In 1970, the supply of health personnel with requisite professional training in public health falls short of needs by almost 6,000, and the projection for 1975 places this figure at nearly 9,000. These needs are primarily in official state and local health agencies.

Our resources to meet these challenges, particularly trained personnel able to plan and to deliver needed health services, to teach others and to develop new ideas, are in very short supply. To prepare individuals in the ever-increasing areas of public health services with the necessary professional knowledge on which to base sound judgement, will require time and strong financial support. The institutions in which planning, teaching, and learning take place are not now organized to perform all the tasks demanded of them.

The existing organization and staffing of our public health agencies must also be reevaluated in terms of their relevance to the missions now required of them. There is the monumental task of retraining personnel at all levels to prepare them for responsibilities which are new to the public health sector, such as the management of personal health services in inner-city and rural poverty areas and expanded family planning services, and for working under new relationships as changes in public health programs are implemented.

With the proliferation of new services administered through public health agencies and the special skills required in public health, administration of public health services has become much more complex. To meet these manpower demands more adequately requires optimal utilization and development of training program resources in agencies, institutions, and organizations capable of providing a variety of specialized training in public health and the restructuring of curriculum offerings to assure their pertinence to the constantly changing health problems of today's society.

Institutional support in the field of public health is authorized under section 309 of the Public Health Service Act, and is complemented by professional traineeships under provisions of section 306. Matching grants for construction of public health teaching facilities are included in the authority for construction grants for training of health professions personnel.

Institutional Support	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Formula grants to schools of public health..........	---	$5,054,000	---	$5,054,000	---	---
Project grants for graduate training in public health:						
Non-competing...........	75	3,275,000	60	3,500,000	-15	+$225,000
Competing renewals......	24	1,000,000	22	900,000	-2	-100,000
Supplementals...........	(2)	42,000	(2)	17,000	---	-25,000
New.....................	5	200,000	3	100,000	-2	-100,000
Subtotal, project grants	104	4,517,000	85	4,517,000	-19	---
Total.................	104	9,571,000	85	9,571,000	-19	---

Institutional support in this field is available through formula grants to schools of public health, and through the competitive project grants for graduate training in public health, which are authorized under sections 309(c) and 309(a), respectively, of the Public Health Service Act.

The formula grants are awarded to accredited schools of public health for the purpose of assisting those schools in the provision of comprehensive professional training, specialized consultative services and technical assistance in the fields of public health and in the administration of state or local public health programs. These grants help the schools to assure that their curriculum offerings provide the preparation necessary for, and pertinent to, the constantly changing health problems in today's society. In addition, this support assists the schools in maintaining their professional resources for fostering continuing education programs and participating in local, state, and national public health activities. Funds are allocated primarily for faculty and supportive personnel, with the remainder budgeted for equipment and other purposes.

With encouragement of formula grant support, the schools of public health increased their enrollment by nearly 60 percent, and graduates by some 50 percent, over the five-year period ending with the 1968-69 school year. Statistics being compiled now are expected to show still further comparative increments for 1969-70.

In addition to expanding their educational capacities, these institutions have also made noteworthy progress in modifying their programs to address the most critical health problems of comprehensive health care, updating the skills of professional health personnel in the field, providing consultative assistance to agencies at all levels of government. Examples of these activities include administrative responsibility for health care in an urban poverty area, short courses for health agency staff in subjects such as family planning, and participation on various advisory and planning groups concerned with personal, community, and environmental health services.

In 1971, formula grants totalling $5,054,000 were awarded to the 16 accredited schools of public health. The 1972 amount, also $5,054,000, will provide continuing support to the same 16 institutions, in addition to the one new school of public health which will become eligible for these grants next year.

Project grants are awarded to schools of public health and other public or non-profit private institutions providing graduate or specialized training in public health for the purpose of strengthening or expanding such public health training. The program extends beyond the 17 schools of public health to other types of institutions such as schools of medicine, dentistry, nursing, engineering, and hospital administration, which are capable of developing and carrying out programs in community and public health. These grants have helped to develop curriculum offerings at the graduate level in such curriculum areas as preventive and community medicine, medical care economics, family planning and population studies, organization and administration, health administration, environmental health, public health nursing, preventive dentistry, and public health nutrition.

The results of this program, the preparation of leadership personnel for public health services and the development of educational resources, are gained through a variety of projects which expand and improve the national pool of public health manpower. Examples of current projects include teaching community health concepts to medical and dental students through course work and field experience; developing competency of public health professionals to deal with environment-related health problems such as accidental injury, noise exposure, food, water, and air sanitation and housing hygiene; and training health administrators in planning and management of health care systems and community health programs. It is important to recognize that the essence of these project grants is their flexibility to be redirected into new emphasis.

The 1971 amount of $4,517,000 for project grants will support about 104 awards in a variety of institutions to strengthen and develop programs of graduate or specialized public health training. In 1972, the same appropriation level will provide for approximately 85 grants, allowing for a higher average amount per grant due to rising costs of maintaining educational activities. In both 1971 and 1972, however, a few new projects can be supported as funds become available when previously funded projects are completed. These discretionary monies will be carefully directed into areas of public and community health which have been identified as having highest priority. Specifically, emphasis will be placed on such areas as nutrition, particularly concerning both inner city and rural problems of malnutrition, and on preventive health services, such as for mothers and children and the disadvantaged, in localities or regions where health services are of poor quality or are nonexistent.

Student Assistance	1971	1972	Increase or Decrease
Professional traineeships:			
Residencies	$675,000	$675,000	---
Apprenticeships	650,000	650,000	---
Short-term	600,000	600,000	---
Long-term	6,475,000	6,475,000	----
Total	8,400,000	8,400,000	---

Traineeships for professional public health personnel are authorized under section 306 of the Public Health Service Act, to support students taking graduate or specialized training in public health. The objective of the traineeships is the same as that for project grants described earlier, as both of these programs help to supply manpower which comprises a national resource of leaders and teachers for various agencies and educational institutions. The student assistance funds are directed into the same areas of high priority, and many traineeship grant recipients are receiving companion support for faculty and curriculum enrichment under the project grant mechanism.

Traineeship grants are awarded to the institutions providing the training, with the grantee having responsibility for selection and appointment of individual trainees. Students who take advantage of this program, most of whom are employed by state and local health agencies, represent a broad spectrum of health disciplines including such professions as medicine, dentistry, nursing, and engineering.

Types of training made available through these traineeships are: (a) Post-professional, long-term academic training; (b) short-term training to update skills of personnel already working in public health; (c) residency training in preventive medicine and dental public health; and (d) apprenticeships for medical and dental students in preceptor-guided training in public health.

The $8,400,000 estimated for public health traineeships in 1971 will support approximately 5,865 trainees. The request for 1972 is, again, $8,400,000, but careful programming of competing funds in the program base will allow concentration of resources in critical areas--most immediately through apprenticeship and short-term training, and also through the longer range effect of academic training. Particular attention will be directed toward encouraging larger numbers of physicians and dentists to enter service in economically disadvantaged areas, thereby establishing and improving preventive and community health care. Personnel trained for this kind of health practice will be specially aware of, and skilled in treating the problems of malnutrition, narcotics and drug abuse, family planning, and health services to mothers and children. Short-term training projects will be more responsive to local manpower needs, as this program mechanism develops under its second full year of operation as a decentralized activity of the regional offices.

Direct Operations	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
	24	$530,000	24	$573,000	---	+$43,000

Direct operations supporting the several programs for training in public health are designed to promote the types of educational innovation and development which will assist in preparing adequate numbers and types of health workers to meet the highest priorities of community and public health. In this context, staff resources are allocated to grants programming, information and data, and evaluation activities which bear on the mix of institutional support and student assistance available for expansion and improvement of the Nation's pool of public health manpower.

In 1971 and 1972, grants programming will be directed to consultation with educational institutions and professional organizations which can most readily utilize resources for training in the identified areas of nutrition, maternal and child health, and preventive services to people in disadvantaged situations. The ten new positions requested for allied health training which will be allocated to decentralized program management through the regional offices will also serve the public health training program.

Regional functions will include staff input to review and approval of nationally competitive project grants, as well as direct handling of grants or contracts which are placed where they are most responsive to local needs.

Information and data and evaluation activities in 1971 are centered on developing methodology for studying the effectiveness of public health training grants. This study, to be carried on in 1972, will assess the present grant mechanisms and identify changes that are necessary in light of changing national manpower demands.

Allied Health

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..............	44	$621,100	64	$966,100	+20	+$345,000
Other expenses..............	---	18,865,900	---	29,687,900	---	+10,822,000
Total..................	44	19,487,000	64	30,654,000	+20	+11,167,000
Subactivities:						
Institutional Support.....	---	9,750,000	---	10,000,000	---	+250,000
Student Assistance........	---	3,750,000	---	3,750,000	---	---
Educational Grants and Contracts, and Direct Operations.............	44	5,987,000	64	16,904,000	+20	+10,917,000
Total................	44	19,487,000	64	30,654,000	+20	+11,167,000

Demands and expectations for health care far exceed the current level of health services and the capacity of educational and other institutions to prepare sufficient numbers of personnel to provide the broad array of health services made possible by advances in health technology. Simply stated, there are major current needs for health manpower, and these needs are accelerating. Indeed, the lack of allied health manpower is a most serious problem as we aspire to bring the full potential of modern medicine to all members of our society. In 1970, there was an estimated shortage of over one-quarter of a million of these professional and technical health personnel, and the deficit is expected to increase markedly in the next ten years. Some of the areas in which the largest numerical shortages exist include medical laboratory personnel, radiologic personnel, and dental auxiliaries. By 1980 the estimated supply of allied health personnel will fall short of requirements by over 430,000 workers.

While other health professions manpower needs have received major attention for a number of years, only recently has attention been directed to the essential contributions of allied health personnel in the provision of modern health services.

Allied health personnel have already demonstrated their effectiveness in many health care settings, improving the utilization of health manpower through greater use of supportive personnel in the delivery of vital services. Still, though, this manpower potential has been developed to only a very limited extent in the American health care system. More general use of allied health workers in this country requires more efficient utilization of our present training capacities and experimentation with, and development of, new and improved ways of training and using these personnel.

Allied health personnel are prepared for employment in different types of programs, each suited to its particular occupational requirements for performance on the job. Within these programs, the patterns of education and training are still changing and developing--in methodology and content, as well as the setting in which training takes place. As different systems for care emerge, better ways of preventing illness are devised, technologies change, and quantitative requirements increase, training resources must be assisted to keep pace with the rising demands that scientific and social change are placing on them.

It is of utmost importance that our efforts to produce greater numbers of allied health personnel include simultaneous support to a wide variety of activities directed toward priority areas in this field--expansion of enrollment, increasing the numbers and quality of teaching personnel, and organizing improved programs of coordinated training in the various disciplines.

The primary objective of the programs and funding proposed for 1972 is to continue developing a flexible framework of Federal assistance in the planning and development of more effective national programs for training allied health manpower. Toward this purpose support will be directed to experimenting with a variety of new approaches in the education and training of allied health personnel, updating and modifying training programs, increasing the numbers of teachers, administrators, supervisors, and other allied health leadership personnel, and increasing numbers of trained personnel.

Institutional Support	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Basic improvement grants...	335	$9,750,000	---	---	-335	-$9,750,000
Special improvement grants (new).....................	---	---	100	$10,000,000	+100	+10,000,000
Total...................	335	9,750,000	100	10,000,000	-235	+250,000

In 1970 and 1971, institutional support for allied health professions training programs has been allocated through basic educational improvement grants. These grants have been awarded under a statutory formula to junior colleges, colleges, and universities which qualify as "allied health training centers", for curriculum improvement and expansion of enrollment capacity. In 1970, formula grants were awarded to 302 schools to help support an enrollment of almost 23,000 students in 717 curriculums. Available funds covered 64.9 percent of the amounts to which grantee schools were entitled. An estimated 335 institutions will receive awards in 1971, at approximately 55-60 percent of the statutory entitlement.

The budget for 1972 includes no funds for formula grants, but instead shifts these resources to the more flexible project-type special improvement grants. These grants will be made to allied health training centers to assist in the provision, maintenance, or improvement of the specialized functions which these centers serve. The $10,000,000 request is an increase over the 1971 amount of $9,750,000 awarded under the formula mechanism. No special improvement grants have been awarded previously, since they would have been available only from sums remaining after 100 percent coverage of the formula grants which have never been fully funded.

The new plan, wherein special improvement grants are not dependent on the formula grant funding, will serve a dual purpose. The requested $10,000,000 will provide continuity of support to schools previously receiving entitlement funds which have the greatest potential for curriculum improvement and expansion of enrollment capacity, and will allow concentration of resources to target support on high priority areas and to sharpen the focus of allied health educational programs in these institutions.

Student Assistance	1971	1972	Increase or Decrease
Professional traineeships:			
Long-term training	$2,750,000	$2,750,000	---
Special institutes training (short-term)	1,000,000	1,000,000	---
Total	3,750,000	3,750,000	---

Traineeship grants for advanced training are awarded to support traineeships for students preparing to teach, or to serve in an administrative, supervisory, or specialist capacity in an allied health discipline.

The shortages of competent faculty and other leadership personnel in the allied health field probably constitutes the greatest obstacle to the rapid expansion of allied health manpower to meet the needs for health services. As education programs enlarge and new programs are added, the shortage of qualified teachers will become increasingly more severe.

The shortage of teachers, administrators, and other personnel with leadership capabilities in the allied health disciplines is such that persons with technical proficiency in these occupations and professions must acquire special teaching, administrative and other skills in the shortest possible time. While continuation and expansion of traditional advanced training programs requiring four to six years after high school are essential, innovative programs utilizing modern teaching methods must be developed to reduce the time required.

Although most teaching is thought of in terms of classroom settings, most of the allied health occupations require a large component of clinical or practical training. Too often clinical instructors have little or no teacher training, but are selected on the basis of their professional competence as practitioners. Training in teaching techniques could significantly enhance their effectiveness as teachers.

Support of special programs of less than a full academic year will help prepare qualified professionals to teach in the allied health field and will expand the teaching capabilities of professionals who are already serving as teachers and clinical instructors.

While only allied health training centers qualified for traineeship grants through 1970, in 1971 eligibility is being extended to public or nonprofit private agencies, organizations, and institutions which offer high-quality advanced training. This change will enable better utilization of training competencies throughout the field of allied health.

The 1971 appropriation of $3,750,000 for allied health traineeships, an increase of $2,200,000 over 1970, will support some 600 long-term trainees, 200 more than in 1970, in approximately 65 institutions, and will permit the initiation of a program of special-institute, non-academic (short-term) training for about 2,000 trainees. In 1972, requested funding at the same level will provide for continuing emphasis on long-term academic training to prepare teachers, with concurrent development of greater numbers of other leadership personnel. In addition, special-institute training will also focus primarily on teaching skills.

Educational Grants and Contracts and Direct Operations	1971		1972		Increase or Decrease	
	No.	Amount	No.	Amount	No.	Amount
Special projects (grants and contracts):						
Non-competing..........	21	$1,015,000	35	$4,000,000	+14	+$2,985,000
Competing..............	2	170,000	3	300,000	+1	+130,000
Supplementals..........	2	50,000	2	100,000	---	+50,000
New....................	20	3,260,000	110	10,345,000	+90	+7,085,000
Subtotal...............	45	4,495,000	150	14,745,000	+105	+10,250,000
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Direct operations.........	44	$1,492,000	64	$2,159,000	+20	+$667,000
Total................		5,987,000		16,904,000		+10,917,000

Special Projects for Experimentation, Demonstration, and Institutional Improvement (Grants and Contracts)

Through 1970, support of innovative and developmental activities in this field was available through new methods grants to develop, demonstrate, or evaluate methods or curriculums for the training of new as well as known types of health technologists. Appropriations for this purpose were directed mainly into projects involving curriculums for the preparation of health workers at the associate or baccalaureate degree level whose functions will augment the skills of more highly trained professional personnel. For example, funds have been provided to develop training programs for such new types of personnel as the child health associate, family health technologist, and physical therapy assistant. Support has also been provided for a number of programs designed to improve curriculums and methods of training existing types of personnel, including development of a new curriculum in physical therapy, a self-instruction technique for allied health personnel, and a program for community college teacher preparation.

In 1971, with an appropriation of $4,495,000, this program is being expanded in the form of special projects for experimentation, demonstration, and institutional improvement, a broader authority which provides the flexibility necessary to focus attention on several different objectives simultaneously and to target funds to areas of greatest priority. Such support will be available for the purposes of:

(a) Planning, establishing, or developing new programs, or modifying or expanding existing programs, including inter-disciplinary training programs;
(b) developing or establishing special programs, or adapting existing programs, to reach special groups such as returning veterans with experience in a health field, the economically or culturally deprived, or persons reentering any of the allied health fields;
(c) developing, demonstrating, or evaluating new or improved teaching methods or curriculums;
(d) developing, demonstrating, or establishing inter-relationships among institutions which will facilitate the training, retraining, or utilization of allied health manpower;
(e) developing, demonstrating, or evaluating new types of health manpower;

(f) developing, demonstrating, or evaluating techniques for appropriate recognition (including equivalency and proficiency testing mechanisms) of previously acquired training or experience; and

(g) developing, demonstrating, or evaluating new or improved means of recruitment, retraining or retention of allied health manpower.

Approximately 45 grants will be awarded in 1971.

The 1972 request of $14,745,000, an increase of $10,250,000, will support about 150 awards, significantly expanding the thrust into these specific priorities. The increased amount will provide for a larger number of projects, as well as for taking greater advantage of the different types of training capabilities of the respective potential grantees--agencies, institutions, and organizations--who are eligible for this program.

A significant portion of the program increase will be directed into projects to accelerate the production of new high utilization categories of physician and dentist assistants. Approximately 15 currently operating programs will receive funds to increase their enrollments, and five or six other awards will be given to assist in the establishment of new physician assistant programs. Emphasis will be placed on those curriculums, typically based in university medical centers, which prepare physician and dentist assistants to serve in primary health care settings. The enrollment in ongoing programs would be expanded by some 300 students in the fall of 1972 while the capacity of newly developing programs would be programmed for an additional 100-125 enrollees the following year.

Operation MEDIHC will also receive special attention under the special projects authority in 1972. This program of career counselling and guidance for returning veterans helps the serviceman who has been trained in health skills while in military service to capitalize on those skills in civilian life. The objective for 1972 is to support the program at a level which will establish a base from which to raise the number of medically trained service personnel in civilian employment by five percent per year for the next five years. Primarily through the contract mechanism, funds will be available for support of the State MEDIHC agencies, special training of Federal and state counsellors participating in the program, development of methods for utilization and placement of medically trained servicemen in educational and employment settings, and for evaluating the impact of MEDIHC in the field of allied health manpower.

Direct Operations

The potential of institutional support and student assistance in allied health to make a significant impact on health manpower demands is considerably dependent upon the extent, organization, and direction of operating activities through which these training programs are administered. In 1971 staff resources and contract funds for these direct operations are concentrated on: (1) Helping training agencies, institutions, and organizations to design their programs to meet highest priorities for allied health manpower and to take full advantage of available grant support; (2) exploring opportunities which offer the greatest return in developing data on supply, distribution, and resources for training of allied health manpower; and (3) promoting developmental programs to extend total allied health resources through recruitment and counselling, functional job analysis, core curriculum concept, equivalency and proficiency testing, and other areas which complement traditional teaching programs. Specific contract efforts will be primarily involved with projects to encourage returning veterans to enter the health field, focusing particularly on ex-military corpsmen.

The request for 1972 includes increases of 20 positions and $225,000 in contract funds.

The additional contract projects will be administered through the regional offices to support the development of education and training programs which are most responsive to local needs for health manpower. Types of contracts to be undertaken include such projects as: (a) Regional conferences to promote acceptance of equivalency and proficiency testing; (b) demonstrations in the use of equivalency and proficiency testing; (c) developing linkages among the many professions, educational institutions, and employers to expand the functions of allied health personnel; (d) recruitment, placement, training, and utilization of disadvantaged persons desiring to enter the health field; and (e) demonstration projects for placement, training, and utilization of returning veterans in civilian health occupations.

Ten of the new staff positions, one in each region, will also be allocated to strengthening regional office resources for allied health manpower. These specialists will be responsible for technical assistance to educational institutions, management of program activities decentralized to the regions, coordination between agencies, institutions, and organizations interested in allied health manpower development, and providing staff input to the grants review and approval process. The other ten positions will be used for additional staff in central office functions which have been identified as having high priority. Particularly, expertise will be extended in the subject of registration, certification, and licensure of health personnel, and in the recently more prominent field of equivalency and proficiency testing. Curriculum development in physician assistant and other allied health training programs will also be emphasized.

Program Direction and Manpower Analysis

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..................	203	$3,376,200	257	$4,261,200	+54	+$885,000
Other expenses.................	---	1,895,800	---	2,420,800	---	+525,000
Total.......................	203	5,272,000	257	6,682,000	+54	+1,410,000
Subactivities:						
Planning and Analysis:						
Manpower Analysis.........	82	2,685,000	99	3,312,000	+17	+627,000
Grants Policy.............	10	237,000	10	252,000	---	+15,000
Program Planning and Evaluation..............	14	271,000	24	446,000	+10	+175,000
Subtotal..............	106	3,193,000	133	4,010,000	+27	+817,000
Program Direction...........	97	2,079,000	124	2,672,000	+27	+593,000
Total...............	203	5,272,000	257	6,682,000	+54	+1,410,000

Manpower Analysis

The need for improved data gathering and reporting activities and the creation of a reliable data base upon which this Bureau could make basic policy decisions was noted in House Report No. 91-1266, dated June 30, 1970, on the Extension of Programs for Training in the Allied Health Professions. The Committee cited the lack of fundamental data on "(1) present manpower supply in each of the fields, (2) present needs and shortages, (3) projections of future supply and requirements, (4) present and projected numbers and location of programs preparing persons for these fields, (5) present and projected enrollment in such programs, and (6) Federal activities--both in direct training programs and in the support of training efforts."

A new Division of Manpower Intelligence was created in October 1970 to attack such problems through the consolidation of data collection and analysis operations within the Bureau of Health Manpower Education. Even before this report, the Bureau had recognized the need to strengthen its data gathering and reporting activities. In 1969, it authorized a study by the National Archives and Records Service to assist the Bureau in developing a health manpower information system. The final report, which was received in April 1970, recommended the establishment of a focal point for all information about Bureau programs.

There is a serious shortage of information and knowledge about medical and allied health personnel and health professions institutions while Dental and Nursing data is more readily available. A recent Secretary's Task Force and our own studies have made it quite clear that we must have much better intelligence data. A current Senate request for across the board information about all health manpower points up this need.

An increase of $305,000 in addition to funds for 17 new positions will be needed to support new data collection, analyses, reports, and simulation model development in fiscal year 1972.

The formation of the new division basically follows the recommendations of the Archives report. The centralization of the data collection and reporting activities will enable the Bureau to make maximum use of its limited statistical and analytical skills and to direct data gathering and analysis activities to areas of urgent need. The organization of this new Division is along four principal lines: (a) A national clearinghouse for health manpower information, (b) analysis and reports, (c) data systems, and (d) Professional requirements.

(a) National Clearinghouse--The National Clearinghouse is responsible for maintaining an inventory of all health manpower educational programs in the United States. It will develop inventories on health occupational training; construct and maintain institutional data profiles, i.e., data on enrollment, graduates, faculty, students, financing, etc.; develop and maintain a project directory on all Bureau programs, and operate the Bureau Library.

Information concerning training programs in the health occupations has been collected from all educational institutions conducting such programs on the baccalaureate and sub-baccalaureate levels in the six New England States. The information will be published and distributed during fiscal year 1971. A similar survey in the State of New York has been initiated in fiscal year 1971. In fiscal year 1972, it is planned to expand the collection of information to an estimated 15 additional states. The health occupations training information will provide data on the types of training programs, expenses, student assistance available in the institutions, and related information. These surveys will be expanded each year to include other groups of states, with the eventual goal of acquiring health occupations training information from all 50 states. Soon after each survey is completed the information will be published and distributed to educational institutions and high school career counselors to assist them in guiding young people concerning career opportunities in the health occupations. Statistical analyses of the information will be made by the Division and utilized in developing future program plans. The information will be kept up-to-date by periodic resurveys, probably every other year.

The 1972 budget request includes an increase of five positions and $97,000 in project contract funds for the continuation and expansion of health occupational training surveys, the development and expansion of institutional data profiles as proposed by the National Archives and Records Service, and the initiation of an inventory of Federal health manpower activities.

(b) Analysis and Reports--A major focus of activity of the new division is the conduct of statistical surveys and other research concerning the size, characteristics, and related aspects of the supply and requirements for health manpower in relation to the output of institutions that train individuals for service in the health professions and occupations. These investigations are needed in order to achieve maximum success of the programs of the Bureau authorized by legislation and also to help other public and private agencies to plan effectively toward meeting health manpower needs. In 1972 an increase of eleven positions and $183,000 for contracts are requested to collect data, conduct surveys, and prepare analyses and reports on research and statistics concerning health manpower activities. The programs proposed for 1972 will include continuation of the development of a micro-simulation model for projecting health manpower needs, survey of the characteristics of hospital manpower, and analyses of studies on career mobility in the health occupations and inventories of hospital training programs. Increased staff will be employed to analyze and prepare reports on manpower supply and requirements. This staff will consist of mathematical, analytical and survey statisticians, program analysts, economists, and supporting clerical and secretarial staff who will initiate career mobility studies in the health occupations and inventory of hospital training programs.

(c) Data Systems--A major program focus of the new division in fiscal year 1971 and fiscal year 1972 will be the centralization within the Bureau of automatic data processing activities and related resources which will improve its capability to develop, operate and continuously appraise the data collection and information systems which are vital to achieving the Bureau mission. Initially, the data processing activities will be concerned with: (1) Processing data of division programs from grant and loan applications and award documents; (2) the automatic preparation of award documents; (3) the design of forms for automatic data processing to provide for easy capture of information; and (4) providing programming services for the preparation of survey reports and analyses and for the efficient access to data capture. Data processing activities will concentrate on specific operational details relating to programming, data preparation, documentation, systems design, program layouts and coding, compilation, testing, and debugging. Additional activities in fiscal year 1972 will be the reduction of source data to a form for machine input; establishing and developing formal documentation in accordance with the published standards for computer programs and output design, etc; operation of remote terminals on line with computer facilities; development of specialized computer soft-ware packages; and initiating proposals for the modification of existing computer programs and for the acquisition of new equipment. It is essential to management at all levels of the Bureau that specific information be available on an accurate and current basis. The capability to collect, store, analyse, and retrieve information necessary for decision-making by top management is indispensable.

To support these goals and objectives, the major individual program activities that will be continued in fiscal year 1972 are: (1) The construction program's processing and reporting system; (2) a grant, loan, and scholarship reporting subsystem; (3) a system for processing data captured from research surveys and investigations; (4) developing a directory of Bureau research demonstrations and development projects; and (5) an approach to study and apply computer technology to scientific and education research. In fiscal year 1972, one additional position and $25,000 will be used to support expanded data processing services.

In fiscal year 1972, it is planned to initiate new program activities on (1)a document storage and retrieval system; (2) the automation of an institutional profile subsystem; and (3) a data based system for use by the national clearinghouse for health manpower information.

(d) Professional Requirements--Despite an increasing number of health professionals and ancillary health personnel in the United States, there is a decreasing availability of health care services to the population, particularly certain segments of the population, e.g., the poor in rural and center city areas. Of the health manpower shortages, one of the most critical is for physicians to provide entry into the health care system and provide continuing comprehensive care. The long-range goal of this activity will be to increase the capacity of the health care system by studying the demography and efficiency of all health manpower. Special focus will be upon increasing efficiency through improved education and training.

In fiscal year 1972 some of the activities which will be undertaken include a proposed study to determine whether the new specialty of family practice can alter the geographic distribution and specialty distribution of physicians. Other studies to be initiated in fiscal year 1972 will evaluate effective methods of training medical and osteopathic students to efficiently utilize ancillary health personnel.

In fiscal year 1971 and 1972 this program will continue to gather and disseminate information concerning new types of support personnel and continue to identify problems in the professional requirements area.

Grants Policy

The Office of Grants Policy provides a Bureau focus for the development, coordination and review of grant and loan policies, procedures and related matters. Workload will expand due to the development of regulations, guidelines and other materials to implement new programs and major policy changes resulting from the extension and modification of legislative authorizations for health professions and nursing institutional support, student assistance, and construction programs. No program increase is requested.

Program Planning and Evaluation

The Office of Program Planning and Evaluation is the Bureau's focal point for developing and evaluating health manpower programs. The Office conducts analytical studies, recommends alternatives to existing programs, advises the Bureau on the consequences of various courses of action, and formulates long-range program and financial plans. These plans provide the basis for legislative proposals and appropriation requests. The Office also has responsibility for numerous special projects related to the Bureau's programs, e.g., reports required by legislation or requested by Congress (Health Professions Educational Assistance Act, etc.), international activities, liaison with other agencies having responsibilities for manpower training, review of health program proposals with implications for health manpower, etc.

In fiscal year 1972 special emphasis will be placed on planning for new programs, analyzing basic program issues, evaluating programs, and coordinating with other Federal agencies to strengthen the overall national health manpower effort. Justification for the added staff (10 positions) required is as follows:

(a) Program Planning--The program planning activities of the Bureau and its component Divisions are expanding markedly in fiscal year 1971 with the establishment of the Operational Planning System and the extension of the Long Range Plan activity--both of which are the responsibility of the Office of Program Planning and Evaluation. It has not been feasible to devote sufficient staff time to the analysis of fundamental program issues, e.g., alternatives to Federal construction assistance, student aid policy, the concept of family practitioners, physician assistants. Such analyses are critical to basic policy, fiscal and legislative decisions. Moreover, more staff resources are needed to identify the methods of translating analyses to budgetary-legislative-and administrative actions. Additionally, a proposed new program authority for Fiscal 1972 (Health Manpower Education Initiative Awards), would support such innovations as area Health education centers, the development of consortia, and some of the educational aspects of health maintenance organizations. The movement of the Bureau into these new areas will obviously require intensive study and advance planning. Required: Four professionals, one clerical.

(b) Program Evaluation--Under specific legislative mandate the Bureau is required to set aside a significant proportion of its appropriation for programmatic evaluation activities. In 1971 and 1972, a number of major evaluations will be conducted or coordinated by the Office of Program Planning and Evaluation, including studies of costing methods in medical centers and related assessments of program impact. Required: Two professionals, one clerical.

(c) Coordination--Other agencies are increasingly recognizing the fact that an inadequate supply of health manpower is a major constraint to their programs. Several of the agencies have substantial funds available for training of health manpower and have indicated a desire to relate more closely to the Bureau's activities. Among these are Health Services and Mental Health Administration, Department of Labor, Department of Defense, Veterans Administration, and Office of Economic Opportunity. One professional and one clerical position would enable the Bureau to assist these agencies in focusing their activities on the most vital health manpower programs, and likely would result in a greater allocation of resources to health manpower programs.

Program Direction

The Office of the Bureau Director furnishes leadership and direction to the Bureau programs in health manpower development and training, construction and institutional development. The office coordinates the efforts of the various Bureau divisions to assure consistency of purpose and of objectives and promotes studies on health manpower supply requirements and educational programs and facilities. It also guides and supports divisional program management and provides information and administrative management services to the Bureau.

Over the past few years there have been significant increases in the Bureau's programs resulting from implementing the Health Manpower Act of 1968 which requires additional staff for program direction particularly at the regional level. In addition, the 1972 budget includes plans for a new program of health manpower education initiative awards which will require close direction and guidance from the Bureau Director and his staff. This new program will provide a mechanism for a concerted attack on problems which constitute barriers to the effective supply, distribution, utilization, and efficiency of health manpower and will support efforts to relate health manpower education directly to the delivery of health services. It will be possible with this new program which is described in the "Health Professions" section of this budget request to support the development of new organizational forms such as consortia and area health education centers as well as to support specific educational area training programs conducted within them. For these reasons, 27 new positions are requested for the Office of the Bureau Director, nine in the Immediate Office of the Bureau Director, and 18 in the regions. The staff in the Office of the Bureau Director will be required to perform special analyses relating to this new program, for the significant increase anticipated in congressional corespondence, and a small increase in central services such as grants accounting. The increase also recognizes the significant effort which must be made to enroll the disadvantaged into every facet of health training envisaged in this new program.

Regional Activities--Since the Bureau was established until the present time, the Bureau has maintained a skeleton regional organization for the Dental and Nursing Divisions which were established before the Bureau itself was created. However, the Bureau itself has not had sufficient staff to reflect Bureau direction and management of its manpower programs in the regions although studies in connection with the recent reorganization have urged that these functions be strengthened. Bureau direction has been carried out for the most part by the part-time services of the Nursing and Dental regional consultants which has not only been grossly inadequate from the Bureau's point of view, but has affected considerably the Nursing and Dental activities. With activities decentralized to the regions, and others being planned for decentralization, Bureau direction must be put on a more stable footing. The Bureau is committed to assist in the development of programs needed at the local levels to reach the Secretary's manpower objectives. Our request, therefore, includes 18 additional positions to provide an Associate Regional Health Director for Manpower for each of the nine regions (Seattle is provided for in the 1971 budget) together with either an assistant or public health advisor in each of these nine regions as the situation demands.

Program Purpose and Accomplishments

Activity: Medical, dental, and related health professions--institutional support (Public Health Service Act, Title VII, Part E).

	1972	
1971	Authorization	Budget Estimate
$147,350,000	Being requested	$256,358,000

Purpose: These funds provide financial assistance to health professions institutions to maintain or improve education quality, and to increase the number of graduates in order to alleviate the Nation's shortage of health professionals.

Explanation: There are three types of grants in the educational improvement program:

(a) Capitation Grants: Awarded to schools of medicine, osteopathy, and dentistry on the basis of the number of students graduated by the school to help insure the financial viability of the school.

(b) Special Project Grants: Supply broad range assistance to health schools to experiment with programs designed to increase the supply of trained personnel, to improve the faculty and curricula, to increase enrollment, and to alleviate financial difficulties.

(c) Health Manpower Education Initiative Awards: Funds will help achieve special national health manpower goals, such as: establishment of area health educational centers, training of physician assistants, etc.

Accomplishments in 1971: Funds were awarded to 271 schools mainly to alleviate problems of financial need and to increase school enrollment.

Objectives for 1972: We plan to make awards to 276 health professions schools with emphasis on the most critical shortage occupations--medicine, osteopathy, and dentistry--to achieve the above stated purposes. New health manpower education initiative awards including area health education centers will also be supported.

Activity: Medical, dental, and related health professions--student assistance (Public Health Service Act, Title VII, Parts C and F).

	1972	
1971	Authorization	Budget Estimate
$40,500,000	Being requested	$47,637,000

Purpose: The expense of health manpower education and training places a heavy financial burden upon students and their families. This factor discourages many highly motivated and qualified individuals from entering the health professions. The health professions student loan and scholarship programs lower these financial barriers, especially enabling those from economically deprived families to pursue a health career.

Explanation: The loan and scholarship programs aid students from financially disadvantaged families to enter the health professions. In 1971, all students of the health professions (medicine, dentistry, osteopathy, podiatry, pharmacy, optometry and veterinary medicine) were eligible for loans and scholarships. In 1972, the direct loan program is being phased out in favor of the Office of Education's expanded guaranteed loan program. However, we will continue to aid those students who are currently enrolled in the existing loan program. The emphasis in 1972 will be on critical shortage health occupations of medicine, osteopathy, and dentistry for which there will be initiated a new scholarship program to benefit these students in their first two years of school, after which they are eligible for the Office of Education's guaranteed loan program.

Accomplishments in 1971: It is estimated that 21,768 students are receiving health professions loans and 17,669 students are receiving scholarships in fiscal year 1971.

Objectives for 1972: We expect to support eligible schools with funds enabling them to award loans to 16,332 students previously aided by the direct loan program; additional students will be aided through the Office of Education's guaranteed loan program which has been expanded to provide a $5,000 loan per student instead of the $2,500 limit under previous authorities. Scholarships will be awarded to 30,436 students in all, 11,053 students of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, and veterinary medicine who are currently receiving scholarships aid, and 19,383 new students of medicine, osteopathy, and dentistry.

Activity: Medical, dental, and related health professions--construction (Public Health Service Act, Title VII, Part A).

1971	1972 Authorization	1972 Budget Estimate
$129,039,413[1/]	Being requested	$113,000,000 [2/]

1/ Includes:

	Appropriated	Carryover
Health professions	$118,100,000	$2,706,838
Nursing..........	8,000,000	232,575

2/ Includes: Appropriation request, $98,000,000; carryover $15,000,000.

Purpose: Grants are awarded primarily to health professions and nursing schools for construction of educational facilities including research and library space where appropriate.

Explanation: In 1972, under the proposed consolidated construction authority, health professions, nursing, allied health, library and health research construction may be assisted by matching grants, as well as guaranteed loan and interest subsidies on privately financed construction.

Accomplishments in 1971: An appropriation of $126,100,000 (excluding $15,000,000 reserved for awards in fiscal year 1972) which includes $8,000,000 for schools of nursing, was awarded in fiscal year 1971 which will increase the number of first-year places for physicians by 425-450, for dentists by 150-200, for other health professionals by 125-150, and for nurses by 500.

Objectives for 1972: An $8,000,000 request to provide three percent interest subsidy payments will support $296,000,000 in construction projects in all privately financed eligible disciplines. Grant funds requested include $90,000,000 in new funds plus $15,000,000 carried forward from 1971 for a grant program level of $105,000,000.

Activity: Medical, dental, and related health professions--educational grants and contracts, and direct operations (Public Health Service Act, Title III, Part A, Title IV, Part C).

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
329	$14,924,000	Indefinite	382	$17,050,000

Purpose: Educational grants support experimental and innovative studies of curricula changes, need for facilities, and cost studies of medical and related health professions education. Contract funds will allow investigations to be carried out to test computer-assisted and other new teaching methods, and to evaluate the performance of medical and other health professions students. Direct operations funds provide support for intramural programs and for the administration of the program.

Explanation: Educational grants and contracts are made to individuals, universities, and nonprofit organizations to promote and stimulate research in areas of need. Awards from this program will be made to develop new techniques in health professions education such as better auxiliary utilization; to shorten curricula; to study the distribution of available manpower; to determine the need for and condition of teaching facilities, and to evaluate the programs in health manpower. Direct operations funds are also used to provide the expertise necessary to achieve Bureau goals, i.e., staff, consultants, and other related expenses.

Accomplishments in 1971: Funds are being utilized to fund several projects relating to the above program goals and to support 329 positions administering these programs of physician, dental, and health professions education.

Objectives for 1972: Programs will be supported with the requested $17,050,000 that will promise additional increases in health professional productivity by training multiple medical and dental auxiliaries in expanded functions. In addition, projects concerned with new teaching methods, which may result in a shorter period of academic preparation of physicians and other related health professions, will be pursued. Support is provided for program planning, development, and administration of the new program of health manpower education initiative awards, a major segment of which is the creation of a national network of area health education centers. Programs to establish and maintain surveillance of public water supplies and to institute school fluoridation programs in 30-40 elementary schools will also be carried out in 1972.

Activity: Nursing--institutional support (Public Health Service Act, Title VIII, Part A).

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$11,500,000	Being requested	---	$18,200,000

Purpose: Funds for institutional (special project grants for the improvement of nurse training) grants are used for projects to expand the functions of the nurse and to improve, strengthen or expand programs to teach nurses, with the ultimate result of better health care for the Nation. They are also used to assist schools in serious financial straits to continue in operation and to avoid curtailment of enrollment.

Explanation: These project grants are awarded on a nationally competitive basis to schools of nursing and/or health agencies.

Accomplishments in 1971: Over the past six years, awards were made for 232 projects to explore curriculum revision, demonstrate more effective methods of construction, establish new courses and to learn new ways to increase enrollment. An estimated 43,500 nursing students in 415 schools (some indirectly participating) have benefitted from this program.

Objectives for 1972: The estimate for 1972 provides for the continued support of 174 projects started in earlier years and 59 new awards. Of these projects, major emphasis will be placed on 40 new grants which will support physician assistant projects designed to increase and augment patient care services throughout the country by extending the capabilities of physicians by expanding the functions of the nurse.

Activity: Nursing--student assistance (Public Health Service Act, Title VIII, Parts B and D)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
---	$44,580,000	Being requested	---	$38,080,000

Purpose: The nursing student loan and scholarship programs are designed to increase the supply of nurses in the Nation. Traineeships support the graduate and specialized preparation of professional nurses as teachers needed to expand and improve curriculum offerings, and the advanced training needed by supervisors, administrators, and clinical nurse specialists.

Explanation: Under present authorities, funds are provided for student loans at any public or other non-profit accredited school located in a State. Maximum loan per student is $1,500 per year with an aggregate limit of $6,000 per student. In 1972, the direct loan program is being phased out in favor of the Office of Education's expanded Guaranteed Loan program. Grants to nursing schools for annual scholarships to students are limited to $1,500 per student. Schools make the scholarship awards to students who, in the judgement of the school, have an exceptional financial need. Traineeship grants are made to public and non-profit private institutions providing training to cover the cost of traineeships (tuition, fees, stipend, travel, and subsistence).

Accomplishments in 1971: The appropriation in 1971 for nursing student loans supported an estimated 24,000 students; for nursing scholarships, an estimated 17,000 students; and for traineeships, approximately 2,000 long-term and 1,900 short-term trainees.

Objectives for 1972: The estimate for 1972 provides for the continued support of 13,700 students who previously borrowed funds under the old direct loan program to continue their course of study in nursing. Other nursing students will obtain assistance from the Office of Education through the guaranteed loan program. The maximum amount of these loans will be increased to $2,500. The scholarship request will provide for 17,000 students of exceptional financial need. The estimate for traineeships in 1972 will support 2,205 long-term trainees, an increase of 205 over 1971, and 1,900 short-term trainees, the same level as in 1971.

Activity: Nursing--educational grants and contracts, and direct operations (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
145	$9,196,000	Indefinite	153	$10,720,000

Purpose: Educational grants support studies, through scientific investigation, to improve methods and techniques in the delivery of nursing care to patients. Research Training grants enable institutions to establish training programs in fields where there is unusual demand for researchers having skills in nursing specialties and in the field of nursing educational research. Fellowships prepare nurses to do independent research, and to stimulate and guide research of importance to nursing. In direct operations, funds provide for programs to assess the requirements, availability and quality of nursing education; for professional guidance and leadership to meet health goals; to develop, administer, and support grant intramural programs designed to increase the operational effectiveness of nursing manpower; and for recruitment of minorities and the disadvantaged into nursing.

Explanation: Educational grants are made to individuals, universities, and non-profit organizations to promote and stimulate research in improving nursing practice and service, and strengthen the national nursing research capacity. Research Training grants support postgraduate nursing programs on a non-matching basis. Fellowship awards cover the costs of training (Tuition, fees, stipends, travel, and subsistence) nurse researchers. Direct operations support intramural programs conducted by the Division and grant administration costs.

Accomplishments in 1971: In 1971, 43 educational projects will be awarded, an increase of four over 1970; the Research Training program will be maintained at nine universities, the same level as in 1970; and Fellowship funds will provide for 127 fellows, nine less than in 1970. In direct operations, responsibilities include initiation of new recruitment projects designed to broaden the base of potential recruits into nursing and collecting and studying data on schools, students, and graduates, their supply and requirement trends.

Objectives in 1972: The estimate for 1972 will provide support of 41 educational projects, all of which will be continuations; continued support of seven of the nine universities currently participating in the Research Training program; and 123 fellows. Major areas in direct operations to be expanded will be in recruitment of minority and disadvantaged groups; surveys of state needs and resources and studies designed to develop effective use of nurse manpower in home health agencies; initiating refresher and continuing education programs in 15 more states; support of state and local programs through the regional offices; and administering the physician assistant program under Special Project Grants.

Activity: Public health--institutional support (Public Health Service Act, Title III, Part A)

	1972	
1971	Authorization	Budget Estimate
$9,571,000	$27,000,000	$9,571,000

Purpose: Formula grants are awarded to accredited schools of public health to assist those schools in providing training, consultative services, and technical assistance in public health and in the administration of State or local public health programs. Project grants are awarded to schools of public health and other institutions for the purpose of strengthening or expanding graduate or specialized training in public health.

Explanation: Formula grants to schools of public health are awarded on an entitlement basis giving primary consideration to the number of Federally sponsored students attending each school. The project grants are awarded competitively to develop curriculums which are pertinent to changing public health needs including medicine, dentistry, nursing, engineering, and hospital administration.

Accomplishments in 1971: The 16 accredited schools of public health received formula grants to expand and modify their programs to address the most critical public health problems. About 104 project grant awards will be made.

Objectives for 1972: Seventeen formula grants will be awarded, including support to the one new school of public health which has become eligible for this program. Approximately 85 project grants will be awarded, with emphasis on such areas as nutrition, mothers and children, and preventive health services.

Activity: Public Health--student assistance (Public Health Service Act, Title III, Part A)

	1972	
1971	Authorization	Budget Estimate
$8,400,000	$16,000,000	$8,400,000

Purpose: Public health traineeship grants support students taking graduate or specialized training in public health.

Explanation: Traineeship grants are awarded competitively to the institutions providing the training, with the grantee having responsibility for selection and appointment of individual trainees.

Accomplishments in 1971: The $8,400,000 appropriated for public health traineeships will support approximately 1,465 long-term and 4,400 short-term traineeships with attention to such subject areas as health care administration, environment-related health problems, preventive and community health care, and responsiveness to local public health manpower needs.

Objectives for 1972: Public health traineeship support will remain at the same level as 1970.

Activity: Public health--direct operations (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
24	$530,000	Indefinite	24	$573,000

Purpose: These funds support the several programs for training in public health through program planning, information and data, and evaluation activities which bear on the mix of institutional support and student assistance available to expand and improve public health manpower.

Explanation: Direct operations in this activity include staff, contract, and related expenses of the Division of Allied Health Manpower attributable to the Public Health grant programs.

Accomplishments in 1971: Grants programming will be directed to institutions and organizations most ready to provide training in the areas of nutrition, maternal and child health, and preventive health services.

Objectives for 1972: Grants programming emphasis will continue in the same areas as in 1971 and will extend further into medical care and health services administration.

Activity: Allied health--institutional support (Public Health Service Act, Title VII, Part B)

	1972	
1971	Authorization	Budget Estimate
$9,750,000	$35,000,000	$10,000,000

Purpose: Special improvement grants are awarded to allied health training centers to assist in the provision, maintenance, or improvement of the specialized functions which these centers serve.

Explanation: Special improvement grants are awarded on a competitive project basis to junior colleges, colleges, and universities for curriculum improvement and expansion of enrollment capacity.

Accomplishments in 1971: Special improvement grants will be awarded for the first time in 1972. In 1971, allied health institutional support is available through basic improvement grants which will be awarded on a formula basis to approximately 340 schools.

Objectives for 1972: An estimated 100 project awards will be made to schools which have the greatest potential for curriculum improvement and expansion of enrollment, concentrating resources in subject areas of highest priority.

Activity: Allied health--student assistance (Public Health Service Act, Title VII, Part B)

	1972	
1971	Authorization	Budget Estimate
$3,750,000	$10,000,000	$3,750,000

Purpose: Traineeship grants for advanced training are awarded to support students preparing to teach or to serve in an administrative, supervisory, or specialist capacity in an allied health discipline.

Explanation: Traineeship grants are awarded competitively to agencies, institutions and organizations providing the training, with the grantee having responsibility for selection and appointment of individual trainees.

Accomplishments in 1971: Traineeship awards will support approximately 600 long-term and 2,000 special institute trainees.

Objectives for 1972: The same level of funding will support approximately the same number of trainees as in 1971 with continued emphasis on teacher training.

Activity: Allied health--educational grants and contracts, and direct operations (Public Health Service Act, Title III, Part A, and Title VII, Part B)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
44	$5,987,000	$20,000,000[1/]	64	$16,904,000

1/ For special projects; authorization is indefinite as to direct operations.

Purpose: Special projects support experimentation, demonstration, and institutional improvement in allied health training. Direct operations emphasize consultation on training resources, exploration of developing allied health manpower data and promotion of developmental activities in allied health education.

Explanation: Special projects are awarded on a competitive project basis to agencies, institutions, and organizations. Direct operations cover staff, other contracts, and related expenses of the Division of Allied Health Manpower.

Accomplishments in 1971: An estimated 45 special projects will be awarded. Direct operations will center on implementing new legislative authority and developing projects for returning veterans who might enter civilian health occupations and training.

Objectives for 1972: The number of special projects will increase to 150 with special attention to training of physician and dentist assistants. Direct operations will include strengthening of regional office staff and greater resources for developmental activities directed by staff.

Activity: Program direction and manpower analysis (Public Health Service Act, Title III, Part A)

1971		1972		
			Budget Estimate	
Pos.	Amount	Authorization	Pos.	Amount
203	$5,272,000	Indefinite	257	$6,682,000

Purpose: This activity includes the Immediate Office of the Bureau Director, the Office of Grants Policy and the Office of Program Planning and Evaluation, as well as the Division of Manpower Intelligence, and provides direction, coordination and technical guidance to the Bureau programs in health manpower development and training, construction and institutional development. It is the Bureau's focal point for developing and evaluating health manpower programs, and centralizes the data collection and reporting activities of the Bureau.

Explanation: Program direction, guidance, and manpower analysis are carried out by the staff of the Office of the Bureau Director and the other components of this activity.

Accomplishments in 1971: Leadership, direction, planning and evaluation has been furnished to the programs of the Bureau. The Bureau has been restructured to meet new challenges found by the Bureau. The establishment of an improved and centralized data gathering and reporting activities is expected to create a reliable base upon which the Bureau can make valuable policy and other decisions.

Objectives for 1972: Additional funds will be used to implement the new programs outlined in the budget such as the establishment of area health education centers and other programs to increase the supply, quality, and distribution of physicians, nurses, and other related health professions. The Bureau is also committed to assist in the development of programs at the local level in each of the regional offices throughout the United States.

New Positions Requested
Fiscal Year 1972

	Grade	Number	Annual Salary
Medical, dental and related health professions			
Program Analyst	GS-15	5	$121,255
Public Health Advisor	GS-15	1	24,251
Program Analyst	GS-14	3	62,445
Public Health Advisor	GS-14	8	166,520
Educational Specialist	GS-13	1	17,761
Public Health Advisor	GS-13	12	213,132
Grants Management Specialist	GS-12	1	15,040
Public Health Advisor	GS-12	1	15,040
Grants Management Specialist	GS-9	1	10,470
Public Health Advisor	GS-9	11	115,170
Clerical Assistant	GS-7	3	25,746
Public Health Advisor	GS-7	1	8,582
Clerical Assistant	GS-5	3	20,814
Clerical Assistant	GS-4	1	6,202
Commissioned Officer:			
Dental Officer	Senior	1	16,655
		(53)	(839,083)
Nursing			
Nurse Consultant	GS-14	1	20,815
Nurse Consultant	GS-13	3	53,283
Grants Management Specialist	GS-12	1	15,040
Nurse Consultant	GS-12	1	15,040
Public Health Analyst	GS-9	1	10,470
Clerical Assistant	GS-5	1	6,938
		(8)	(121,586)
Allied Health			
Educational Specialist	GS-14	1	20,815
Regional Program Representative	GS-14	4	83,260
Educational Specialist	GS-13	1	17,761
Medical Officer	GS-13	1	17,761
Program Officer	GS-13	1	17,761
Public Health Advisor	GS-13	1	17,761
Regional Program Representative	GS-13	6	106,566
Educational Specialist	GS-12	1	15,040
Public Health Analyst	GS-12	1	15,040
Program Analyst	GS-9	1	10,470
Clerical Assistant	GS-5	2	13,876
		(20)	(336,111)

	Grade	Number	Annual Salary
Program Direction and Manpower Analysis			
(a) Planning and Analysis:			
Public Health Advisor	GS-15	1	$24,251
Medical Officer	GS-14	1	20,815
Program Analyst	GS-14	3	62,445
Program Analyst	GS-13	3	53,283
Statistician	GS-13	1	17,761
Systems Analyst	GS-13	1	17,761
Financial Operations Officer	GS-12	1	15,040
Program Analyst	GS-12	1	15,040
Statistician	GS-12	2	30,080
Economist	GS-11	1	12,615
Program Analyst	GS-11	2	25,230
Statistician	GS-11	1	12,615
Clerical Assistant	GS-7	2	17,164
Statistician	GS-7	1	8,582
Financial Operations Assistant	GS-6	1	7,727
Statistician	GS-6	2	15,454
Clerical Assistant	GS-5	2	13,876
Statistician	GS-5	1	6,938
		(27)	(376,677)
(b) Program Direction:			
Associate Regional Health Director	GS-15	9	218,259
Special Assistant	GS-15	1	24,251
Public Health Advisor	GS-14	5	104,075
Special Assistant	GS-14	2	41,630
Public Health Advisor	GS-13	4	71,044
Clerical Assistant	GS-7	3	25,746
Financial Operations Assistant	GS-7	1	8,582
Clerical Assistant	GS-6	1	7,727
Clerical Assistant	GS-5	1	6,938
		(27)	(508,252)
Total new positions all activities		135	2,181,709

Justifications

Appropriation Estimate

HEALTH EDUCATION LOANS

The Secretary is hereby authorized to make such expenditures, within the limits of funds available in the "Health Professions Education Fund" and the "Nurse Training Fund," and in accord with law, and to make such contracts and commitments without regard to fiscal year limitation as provided by section 104 of the Government Corporation Control Act, as amended, as may be necessary in carrying out the programs set forth in the budget for the current fiscal year.

PAYMENT OF SALES INSUFFICIENCIES AND INTEREST LOSSES

For the payment of such insufficiencies as may be required by the trustee on account of outstanding beneficial interest or participations in the Health Professions Education Fund assets or Nurse Training Fund assets, authorized by the Department of Health, Education, and Welfare Appropriation Act, 1968, to be issued pursuant to section 302(c) of the Federal National Mortgage Association Charter Act, [$169,000] *$232,000,* and for payment of amounts pursuant to section 744(b) or 827(b) of the Public Health Service Act to schools which borrow any sums from the Health Professions Education Fund or Nurse Training Fund, [$2,914,000] *$3,768,000: Provided,* That the amounts appropriated herein shall remain available until expended.

Payment of Sales Insufficiencies and Interest Losses

Amounts Available for Obligation

	1971	1972
Appropriation	$3,083,000	$4,000,000
Estimated transfer to other accounts [1]	3,083,000	4,000,000
Health Professions Education Fund	(2,035,000)	(2,432,000)
Nurse Training Fund	(1,048,000)	(1,568,000)

---

[1] Distribution between Health Professions Education Fund and Nurse Training Fund may vary due to changing interest rate.

Health Professions Education Fund

Amounts Available for Obligation

	1971	1972
Receipts and reimbursements from non-Federal sources	$1,912,000	$1,926,000
Transferred from other accounts (est)	2,035,000	2,432,000
Unobligated balance brought forward	1,145,000	971,000
Other unobligated balances carried forward	-971,000	-893,000
Total obligations	4,121,000	4,436,000

Obligations by Activity and Object

	1971	1972	Increase or Decrease
Cancellations	---	$213,000	+$213,000
Interest	$4,121,000	4,223,000	+102,000
Total obligations	4,121,000	4,436,000	+315,000

Nurse Training Fund

Amounts Available for Obligation

	1971	1972
Receipts and reimbursements from non-Federal sources	$1,448,000	$1,500,000
Transferred from other accounts (est)	1,048,000	1,568,000
Unobligated balance brought forward	2,832,000	1,672,000
Other unobligated balances carried forward	-1,672,000	-2,161,000
Total obligations	3,656,000	2,579,000

Obligations by Activity and Object

	1971	1972	Increase or Decrease
Payment of Participation Certificates	$1,618,000	---	-$1,618,000
Cancellations	---	$540,000	+540,000
Interest	2,038,000	2,039,000	+1,000
Total obligations	3,656,000	2,579,000	-1,077,000

Summary of Changes

1971 Appropriation	$3,083,000
1972 Request	4,000,000
Net change	+917,000

	1971 Base		Change from Base	
	Pos.	Amount	Pos.	Amount
Increases:				
A. Built-in:				
Interest to Treasury	---	$2,126,000	---	+$193,000
Cancellations	---	---	---	+753,000
Total, increases	xxx	xxx	---	+946,000
Decreases:				
A. Built-in:				
Payments to GNMA	---	957,000	---	-29,000
Total, decreases	xxx	xxx	---	-29,000
Total, net change	xxx	xxx	---	+917,000

Explanation of Changes

Increases:

The $753,000 is needed for reimbursement to schools for estimated loan repayments cancelled under section 744(b) and 827(b) of the Public Health Service Act in addition to $193,000 in interest to be paid the Treasury Department due to higher interest rates on appropriated funds loaned to schools.

Decreases:

Refinancing of approximately $5,730,000 of Health Professions Education Fund notes in April 1971 is estimated to be at a higher rate of interest than the 6.25 percent paid at the original financing in 1968. This increase is more than offset by lower interest costs incurred by retirement of $1,618,000 of notes in the Nurse Training Fund for a net decrease of $29,000.

Authorizing Legislation

Legislation	1972 Authorization	1972 Appropriation Requested
Public Health Service Act Payments to Schools to Cover Certain Costs Incurred in Making Student Loans from Borrowed Funds:		
Section 744(b)--Health Professions Schools......	Indefinite	$2,432,000
Section 827(b)--Schools of Nursing.............	Indefinite	1,568,000

Appropriation

Section 744. (b) If a school borrows any sums under this section, the Secretary shall agree to pay to the school (1) an amount equal to 90 per centum of the loss to the school from defaults on student loans made from such sums, (2) the amount by which the interest payable by the school on such sums exceeds the interest received by it on student loans made from such sums, (3) an amount equal to the collection expenses authorized by section 740(b) (3) to be paid out of a student loan fund with respect to such sums, and (4) the amount of principal which is cancelled pursuant to section 741(d) or (f) with respect to student loans made from such funds. There are authorized to be appropriated without fiscal year limitation such sums as may be necessary to carry out the purposes of this subsection.

Section 827. (b) If a school of nursing borrows any sums under this section, the Secretary shall agree to pay to the school (1) an amount equal to 90 per centum of the loss to the school from defaults on student loans made from such sums, (2) the amount by which the interest payable by the school on such sums exceeds the interest received by it on student loans made from such sums, (3) an amount equal to the amount of collection expenses authorized by section 822(b) (3) to be paid out of a student loan fund with respect to such sums and (4) the amount of principal which is cancelled pursuant to section 823(b) (3) or (4) with respect to student loans made from such sums. There are authorized to be appropriated without fiscal year limitation such sums as may be necessary to carry out the purposes of this subsection.

Payment of Sales Insufficiencies and Interest Losses

Year	Budget Estimate To Congress	House Allowance	Senate Allowance	Appropriation
1968	$250,000	$250,000	$250,000	$250,000
1969	200,000	200,000	200,000	200,000
1970	957,000	957,000	957,000	957,000
1971	3,083,000	3,083,000	3,083,000	3,083,000
1972	4,000,000			

Payment of Sales Insufficiencies and Interest Losses

	1971		1972		Increase or Decrease	
	Pos.	Amount	Pos.	Amount	Pos.	Amount
Personnel compensation and benefits..............	---	---	---	---	---	---
Other expenses.............	---	$3,083,000	---	$4,000,000	---	+$917,000
Total....................	---	3,083,000	---	4,000,000	---	+917,000

Fiscal Year 1971

The appropriation for fiscal year 1971 for interest losses and sales insufficiencies is $3,083,000. Included is $2,126,000 for payment of interest to the Treasury Department on appropriated funds loaned to schools during fiscal year 1968 through fiscal year 1970 to capitalize their student loan funds. In addition, the appropriation includes $957,000 for interest due to holders of $15 million of participation certificates issued by the Government National Mortgage Association.

Plans, Fiscal Year 1972

In fiscal year 1972, payment of interest to the Treasury and to the Government National Mortgage Association will continue. However, these interest payments are expected to increase for the reasons outlined in the following paragraphs. The assumptions used in arriving at the request of $4 million (an increase of $917,000 over 1971) are:

1. The first involves a change in status (discussed below) of notes held by private investors which were due to be retired in fiscal year 1971. It is anticipated that this change will increase the interest owed on the notes.

One-half of the $15 million ($11.5 million from the Health Professions Education Fund and $3.5 million from the Nurse Training Fund) in notes pledged to the Government National Mortgage Association are due April 8, 1971. The remaining notes are due April 8, 1988. Participation certificates are sold at market demands. There was only a market for sale of participation certificates with 20-year pay-offs totalling $7.5 million of the $15 million offering in April of 1968, when the sale occurred. Consequently, the other one-half of the notes are payable on April 8, 1971.

The original plan was for the GNMA to resell $7.5 million in pledged notes in order to cover the payment due on April 8, 1971. However, the GNMA has now informed the Bureau that any amounts owed but not paid by the Health Professions Education Fund or the Nurse Training Fund, will be financed from unobligated balances available in other Trust accounts of GNMA. There are sufficient funds in the Nurse Training account to pay its share of the note retirement. The Health Professions Education Fund is depleted.

The status of plans relating to the notes due to be retired April 8, 1971, are outlined in the following:

	Health Professions	Nurses	Total
Original notes due to be retired April 8, 1971...........	$5,750,000.00	$1,750,000.00	$7,500,000.00
Less payment of principal already made....................	-20,178.35	-131,821.65	-152,000.00
Actual amount due GNMA on April 8, 1971................	5,729,821.65	1,618,178.35	7,348,000.00
To be retired by borrowing from other GNMA accounts........	-5,729,821.65	-0-	-5,729,821.65
To be retired from balance in Nurse Training Fund..........	-0-	-1,618,178.35	-1,618,178.35

As interest rates are considerably higher now than in 1968, we anticipate that this refinancing of the Health Professions notes will increase our interest payments to the Government National Mortgage Association. This will be offset, however, by a reduction of interest resulting from paying off $1,618,000 of notes in the Nurse Training Fund which reduces the total net payments planned to be paid to GNMA by $29,000.

2. Interest owed the Treasury Department on appropriated funds loaned to the schools is expected to increase. The budget for fiscal year 1971 was based on an estimated interest rate to Treasury of 6.25 percent. The currently estimated rate for fiscal year 1972 is 7.5 percent. The increased interest in 1972 amounts to $193,000.

3. $753,000 is requested for forgiveness of loans in the following accounts:

> Health Professions Education Fund--Cancellations--Loans made to students for the Health Professions Education Fund are subject to certain forgiveness and cancellation benefits. The Act provides that the unpaid balance of a loan and accrued interest thereon shall be cancelled upon the death of a borrower, or if the Secretary determines that a borrower has become permanently and totally disabled. In addition, cancellation benefits are provided for physicians, dentists, and optometrists if they practice in certain areas with the expectation that such cancellation benefits will help relieve the manpower shortage in such areas. Should a borrower engage in the practice of medicine, dentistry, optometry or osteopathic medicine in an area in a state determined by the state health authority to have a shortage of physicians, dentists, or optometrists he may obtain a ten percent cancellation on his loan for each year of practice in such area up to a total of 50 percent of the amount due plus accrued interest. If the practice is performed in a rural area characterized by low income families then a yearly cancellation of 15 percent per year may be given up to a total cancellation of 100 percent of such total.

The Health Professions Education Fund is required to pay to the schools the amount of principal which is cancelled. It is estimated that cancellations through fiscal year 1971 will be approximately $213,000 which we are requesting in accordance with section 744(b), Title VII of the Public Health Service Act, as amended.

Nurse Training Fund--Cancellations--Loans made to students from the Nurse Training Fund are subject to certain forgiveness and cancellation benefits. The Act provides that the unpaid balance of a loan and accrued interest thereon shall be cancelled upon the death of a borrower, or if the Secretary determines that a borrower has become permanently and totally disabled. In addition, cancellation benefits are provided for employment as a professional nurse in public or other non-profit agencies with the expectation that such cancellation benefits will help relieve the shortage of nurses. Should a nurse become employed, as a full-time professional nurse, in a public or other non-profit agency she may have up to 50 percent of the total loan cancelled for such employment. The cancellations shall be at a rate of ten percent of loan balance outstanding on first day of employment, for each year of such employment. Should such employment be performed in a public or other nonprofit hospital in any area which is designated to be an area which has a substantial shortage of nurses at such hospitals, the annual cancellation shall be at the rate of 15 percent for each year of employment at such hospital up to a total cancellation of 100 percent.

The Nurse Training Fund is required to pay to the schools the amount of principal which is cancelled. It is estimated that cancellations through fiscal year 1971 will be approximately $540,000 which we are requesting in accordance with section 827(b), title VIII of the Public Health Service Act, as amended. The 1972 request of $4,000,000 is distributed among the following categories:

$3,015,000--Payment of Interest Differential to Institutions
(2,004,000)--Health Professions Education Fund
(1,011,000)--Nurse Training Fund

$232,000--Payment of Insufficiencies
(215,000)--Health Professions Education Fund
(17,000)--Nurse Training Fund

$753,000--Payment of Cancellations
(213,000)--Health Professions Education Fund
(540,000)--Nurse Training Fund

Interest Losses (Differential)

Health Professions Education Fund--An appropriation of $2,004,000 for fiscal year 1972 is requested for reimbursement of interest losses of health professions schools capitalizing student loan funds by loans from the Health Professions Education Fund. Section 744(b) of the Public Health Service Act provides for the reimbursement to the schools for the difference between the interest owed to the government on the loans and the amount (interest) collected from student borrowers. By the end of 1972, the losses owed to schools since the fund became operational in 1968 will total about $5,200,000. No significant interest payments will be received from students through 1972.

Only $2,004,000 is needed in 1972 however, to meet the following payments:

1. $604,000 owed to the Government National Mortgage Association in 1972, on $11,500,000 of pledged notes, carrying an interest rate (owed by the schools) of 5.25 percent.

2. $1,400,000 owed to the United States Treasury in 1972, on an estimated $18,671,000 of appropriated funds loaned to schools. Estimated Treasury rate for 1972 is 7.5 percent.

Nurse Training Fund--An appropriation of $1,011,000 for 1972 is requested for reimbursement of interest losses of nursing schools capitalizing student loan funds by loans from the Nurse Training Fund. Section 827(b) of the Public Health Service Act, provides for the reimbursement to the schools for the difference between the interest owed to the government on loans and the amount (interest) collected from student borrowers. By the end of 1972, the losses owed to schools since the fund became operational in 1968 will total about $2,900,000. No significant interest payments will be received from students through 1972.

Only $1,011,000 is needed however to meet the following payments in 1972:

1. $92,000 owed to Government National Mortgage Association in 1972, on $1,750,000 of pledged notes, carrying an interest rate (owed by the schools) of 5.25 percent.

2. $919,000 owed to the United State Treasury in 1972, on an estimated $12,256,000 of appropriated funds loaned to schools. Estimated Treasury rate for 1972 is 7.5 percent.

Insufficiencies

Health Professions Education Fund--The 1972 request for insufficiencies is $215,000. This is based on an estimated $819,000 interest due the Government National Mortgage Association in 1972 on $11,500,000 of pledged notes (half of which are held by private investors) less some $604,000 estimated from interest differential payments to be received through participating health professions schools.

Nurse Training Fund--The 1972 request for insufficiencies is $17,000. The estimate is based on an estimated $109,000 interest due the Government National Mortgage Association in 1972 (6.25 percent on $1,750,000 in notes held by private interests) less some $92,000 (5.25 percent of $1,750,000) estimated from interest differential payments to be received through participating nursing schools.

Cancellations

Health Professions Education Fund--The 1972 request for payment of loan cancellations to participating schools under section 744(b) of the Public Health Service Act is $213,000.

Nurse Training Fund--The 1972 request for payment of loan cancellations to participating schools under section 827(b) of the Public Health Service Act is $540,000.

STATEMENT OF DR. KENNETH M. ENDICOTT, DIRECTOR, BUREAU OF HEALTH MANPOWER EDUCATION

ACCOMPANIED BY:
- DR. ROBERT Q. MARSTON, DIRECTOR, NATIONAL INSTITUTES OF HEALTH
- DR. DANIEL F. WHITESIDE, ASSOCIATE DIRECTOR, BUREAU OF HEALTH MANPOWER EDUCATION
- DR. HARRY W. BRUCE, JR., DIRECTOR, DIVISION OF PHYSICIAN AND HEALTH PROFESSIONS EDUCATION
- DR. JOHN C. GREENE, DIRECTOR, DIVISION OF DENTAL HEALTH
- MISS JESSIE M. SCOTT, DIRECTOR, DIVISION OF NURSING
- ROBERT E. LEARMOUTH, EXECUTIVE OFFICER, BUREAU OF HEALTH MANPOWER EDUCATION
- JOHN P. BUCKLEY, ACTING CHIEF, FINANCIAL MANAGEMENT STAFF, BUREAU OF HEALTH MANPOWER EDUCATION
- LELAND B. MAY, ASSISTANT DIRECTOR OF FINANCIAL MANAGEMENT (BUDGET) NATIONAL INSTITUTES OF HEALTH
- CHARLES MILLER, DEPUTY ASSISTANT SECRETARY, BUDGET

PENDING AUTHORIZATION LEGISLATION AND INADEQUACY OF EXISTING AUTHORIZATION

Senator COTTON. Next the very important matter of health manpower.

Now, we have a problem in the Appropriations Committee this year inasmuch as only $168,730,000 of the request of $541,925,000 is authorized. In other words, $373,195,000 of the requested amount is unauthorized.

While it is possible that we may yet get the new authorization in time for us to consider it, I must say that it looks very doubtful at this point since we will proceed in marking up this bill the first of next week.

Incidentally, Mr. Dirks, I ran into Senator Pell, who is on the conference committee. He said they expect to conclude their conference with the House this afternoon. It is possible that we could consider it.

Dr. Kenneth Endicott, Director of the Bureau of Health Manpower Education, accompanied by his staff, will present the request. The names of those accompanying you, Dr. Endicott, will be included in the record, and you may proceed.

Dr. ENDICOTT. Senator Cotton, I was on the telephone. I had word from the conferees that they have broken up today. I think perhaps they are meeting again tomorrow.

Senator COTTON. I was just telling the clerk I saw Senator Pell on the way over and he thought they were going to finish this afternoon. I guess he was too optimistic.

Dr. ENDICOTT. They may have, but our people there didn't see any evidence of it.

Senator COTTON. I don't know what the chairman's instructions will be, but I would expect you are proceeding on the basis of assuming that the authorization comes through.

Dr. MARSTON. No, sir. We are prepared to testify today on those parts of the manpower programs that have authorization but not on those parts that are still being debated.

Senator COTTON. Proceed.

I guess I have my signals straight now. You are going to testify on the items that are already authorized and then if we get this authorization we will have a second round.

Dr. ENDICOTT. Yes, sir. I have been advised that when the legislation is finally enacted we will present a modified budget request.

PREPARED STATEMENT

Mr. Chairman, I have a prepared statement which I would like to supply for the record and make some comments.

Senator COTTON. It will be printed in full in the record along with the biography.

(The biography and statement follow:)

Biographical Sketch

NAME:	Kenneth Milo Endicott
POSITION:	Assistant Surgeon General, Public Health Service, Director, Bureau of Health Manpower Education
BIRTHPLACE AND DATE:	Canon City, Colorado June 6, 1916
EDUCATION:	A.B., University of Colorado, Boulder, 1936 M.D., University of Colorado, Denver, 1939
EXPERIENCE:	Director, Bureau of Health Manpower Education, November 1969 to present Director, National Cancer Institute, National Institutes of Health, U.S. Public Health Service, Department of Health, Education, and Welfare, July 1960--November 1969 Appointed Assistant Surgeon General, U.S. Public Health Service, January 1960 Associate Director, National Institutes of Health, 1958-1960 Chief, Cancer Chemotherapy National Service Center, National Cancer Institute, 1955-1958 Scientific Director, Division of Research Grants, National Institutes of Health, 1951-1955 Chief, Section on Metabolic and Degenerative Diseases, Division of Pathology, National Institutes of Health, 1942-1951 Medical Center for Federal Prisoners, Springfield, Missouri, 1942 Maritime Quarantine Station, San Francisco, California, 1941-1942 U.S. Public Health Service Relief and Quarantine Station, Portland, Oregon, 1940 Commissioned in U.S. Public Health Service, 1939
ASSOCIATION MEMBERSHIPS:	Diplomate, American Board of Pathology American Medical Association, Fellow American Association for the Advancement of Science American Association of Pathologists and Bacteriologists Society for Experimental Biology International Association of Medical Museums Society for Experimental Pathology Washington Academy of Sciences Alpha Omega Alpha Phi Rho Sigma Theta Xi
SPECIAL AWARDS:	Distinguished Service Medal of the Public Health Service Commissioned Corps, awarded 1964: "For his outstanding and distinguished leadership in Medical Research Administration and National Cancer Research Programs" First PAP Award for Distinguished Service by the Board of Directors of the Papanicolaou Cancer Research Institute in Miami, Florida, January 9, 1970

I am pleased to be with you once again to discuss how we are going about the job of providing the increased numbers of highly skilled health personnel who are so essential in meeting the health needs of the Nation.

The health professions and nursing legislation expired on June 30 and bills to extend the legislation and improve it have been submitted by the administration. The House of Representatives passed its versions of Health Professions and Nursing bills by nearly unanimous votes. The Senate Subcommittee on Health is preparing to report out bills to deal with the problems of health manpower education.

The budget about which we are here today is based on our ongoing programs which need no new authorizing legislation and those which are in the administration's proposed legislation.

I shall discuss those programs which require no new authorizing legislation; the student assistance provisions which have been extended for one year; and the major issues faced by the Bureau of Health Manpower Education. No matter what legislation is finally passed, we must address ourselves to these issues if we are going to make any significant progress in meeting our health manpower needs. When legislation is finally enacted, we shall present a modified budget request.

Those programs for which we need no new legislative authority are those in Dental Health, Allied Health, Public Health, Manpower Analysis, and general Bureau direction.

Dental Health

The Division of Dental Health seeks to prevent dental disease by the wider use of preventive measures and to make dental manpower more effective.

The number of people drinking fluoridated water has increased by more than 40 million over a ten-year period. Still, about 70 million people on public water supplies are needlessly deprived of this basic health protection; other millions of Americans are not served by community water systems.

The prevention of periodontal disease also receives very high priority. The preventive role of good hygiene has been demonstrated; the goal for the Nation, now, is to make good oral hygiene commonplace. This may be as difficult to achieve as universal water fluoridation.

The Dental Auxiliary Utilization (DAU) program for greater use of auxiliaries is now offered by all the Nation's dental schools. So far, more than 25,000 of the dentists now in practice have had DAU training. The next step is to expand the knowledge gained in this program.

We found in our Manpower Development Center in Louisville that if dentists used four well-trained auxiliaries and if the auxiliaries' functions were expanded, the dentist's productivity can be more than doubled. We want to translate the Louisville findings into action.

Through TEAM, which stands for "Training in Expanded Auxiliary Management," a program developed at our Louisville Center, dental students will learn to oversee and work with a team of auxiliaries. Beginning with seven schools in fiscal year 1971, TEAM will be extended to eight additional schools during fiscal year 1972. After that, expansion will be accelerated; eventually, all dental schools will have active TEAM programs.

Allied Health

Allied health manpower is a fairly new component of the health system; although, for many years, many of its member professions have served well in a wide variety of health-care settings. Personnel such as medical technologists, physical therapists, and dental auxiliaries have long been considered as individual types of assistants not only in terms of their special duties and responsibilities, but also in the separate education and training programs through which they gain their respective knowledge and skills.

Totaling over 900,000 in 1970 and almost doubled in number since 1960, allied health personnel are expected to increase again by more than half in the next decade.

Given these needs, it is essential that we develop a more effective system for preparing allied health workers. The present pattern reflects small individualistic training programs that fragment training resources and reduce their efficiency; it must be re-directed in favor of coordinated educational activities for related disciplines.

In 1972, there will be a shift in the method of basic institutional support; that is, from the formula grant mechanism to the more flexible special improvement project grant. This latter type of grant will enable us to direct support to institutions that demonstrate the most initiative in combining and coordinating allied health curricula and, at the same time, we hope to maintain support and to avoid hardship to those schools that have been receiving significant amounts of formula grant monies. Further, Special Projects for Experimentation, Demonstration, and Institutional Development, which are broader in purpose than the former grants for curriculum and teaching-methods development, would have a significant increase in funding.

In addition, we are expanding the MEDIHC program--a program to encourage servicemen and women with medical training to enter civilian medical professions when they leave military service.

Public health

Our program for public health manpower development in 1972 will be focused on some of the most pressing health problems we face--providing more trained professional health personnel for the delivery of health services to people in urban ghettos, to the rural poor, to other disadvantaged groups of people, or to all of us in relation to prevention of disease or health maintenance.

Manpower analysis

The Division of Manpower Intelligence, created by the Secretary in October 1970, serves as the focal point for developing, reporting, and interpreting health manpower data and analyses in the Federal government.

The Division is still in the process of organizing to produce accurate statistics and analytical data on the health professions and health occupations. To direct the Nation's resources toward a comprehensive Federal health manpower strategy, reliable and comparable data and statistics are urgently needed.

During fiscal year 1972, some of the fundamental data the program will begin to collect and analyze are (1) accurate and up-to-date information on supply of personnel in the health professions and the allied health occupations; (2) existing needs and shortages in each of the health professions and allied health occupations; (3) projections of future need and supply, assuming different socio-economic variables such as modification of Medicare-Medicaid legislation, increasing or decreasing and shifting population projections; (4) present and projected numbers of universities, colleges, and programs preparing individuals for the health professions and occupations; (5) present enrollment in these programs and projection of enrollment based on various levels of Federal-State-local input; and (6) Federal activities in these areas and the influence of such Federal activities.

Regional staffing

From the time of the Bureau's establishment in January 1967 to the present, a skeletal regional staff representing the Bureau has been maintained. This staff consisted of representatives of the Division of Nursing and of Dental Health, which were in existence before the Bureau was created.

Regional activities must be put upon a more stable footing. The Bureau, therefore, plans to strengthen the regional office operation to help in the development of health manpower programs needed in the States and localities.

Student assistance

Both the House and the Senate passed a straight one-year extension of the present student loan and scholarship programs so that schools could begin making their necessary financial aid arrangements with September students. This extension, which became law on July 9, provides scholarship grants and loans of up to $2,500 each year for students in the health professions and up to $1,500 for students of nursing. It also provides funds for nurse traineeships to increase the number of nursing faculty. If legislation being considered now is enacted, it would take the place of the extension in fiscal 1973.

Under this extension, student loans will assist 22,400 students in the health professions and 24,000 in schools of nursing in this fiscal year. Approximately 18,300 students in the health professions and 17,000 nursing students will be helped by the scholarship grants in this extended legislation. Approximately 2,000 nurses will receive long-term and 1,900 short-term intensive training.

The students who successfully complete their education and practice in designated shortage areas can have their loans completely cancelled.

Our formal budget request anticipated passage of new authorizing legislation which would have made significant changes in the Student Assistance programs. That legislation has not yet passed, but the Congress has passed legislation providing for a one-year extension of existing Student Assistance programs for physicians, dentists, nurses, and related health professions. Therefore, we are modifying our request for student assistance for 1972 to conform to the extension legislation and are requesting the same amounts for these purposes as provided in FY 1971.

Overriding issues

No matter which particular bill finally becomes law, there are some issues which have to be met. The administration bill, upon which the budget is based, attempts to meet these problems. So do the bills passed by the House and those being considered by the Senate.

The issues are: the shortage of health manpower; the financial distress of the health professions schools; the distribution of manpower; bringing significant health education programs into rural and inner city areas; opening health careers to all talented young people without regard to economic, social, and racial considerations; and improving curriculum of health professions schools.

- Shortage of manpower: Anyone who has waited in a doctor's or dentist's office or in an emergency room of a hospital does not have to be told about the shortage of health professionals. In 1970, there were an estimated 323,000 active physicians in the United States--or 154 per 100,000 population. This represents a small and gradual increase from the 141 per 100,000 in 1950 during which time the demand for services increased tremendously.

- Financial distress of schools: During the past year, 61 health professions schools have applied for and received funds because of financial distress. Several schools have made public their fears that they will have to close unless they can find some solution to their chronic financial distress. The Nation cannot afford to have health professions schools close in the face of major manpower shortages. We must develop some long-range solutions to this problem.

- Distribution of manpower: Today, there are at least 130 counties with no doctor and at least 225 counties with no dentist. Each year, more counties will join this list. In some of our large cities, the inner city areas are served by decreasing numbers of active health professionals. Fewer and fewer young physicians are training for practice in family medicine. We must find some way to reverse these trends.

- Health manpower education in shortage areas: In rural and inner city areas there is little opportunity for high quality health careers education. If we want to bring a higher degree of quality health care to sparsely populated or inner city areas, we must provide attractive opportunities for health professionals and allied health personnel to learn and practice in these areas.

- Opportunities for disadvantaged: The Nation's disadvantaged population do not share in the major advances in health care. Students who are disadvantaged either because of race, economics, or geography, often do not have the opportunity to assume important places in the health professions. If we are to assure good health care for disadvantaged people, we have to provide opportunities for these groups to enter and prosper in health professions training.

- Improved curriculum: The technical advances taking place in the field of communications and theory in the past decade should be put to use by institutions and curricula should be shortened so that the production of health professionals can be accelerated and improved to produce the best-trained health professionals.

Miss Jessie Scott, Director of our Division of Nursing, whose legislation is still under consideration, is here to comment about the major issues confronting nursing today if you wish to call her.

I will be happy to answer any questions you may have.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

National Institutes of Health
Payment of Sales Insufficiencies and Interest Losses

List of Witnesses

Dr. Kenneth M. Endicott, Director

accompanied by

Dr. Robert Q. Marston, Director, National Institutes of Health

Robert E. Learmouth, Executive Officer, Bureau of Health Manpower Education

John P. Buckley, Acting Chief, Financial Management Staff, Bureau of Health Manpower Education

John E. Sharkey, Director of Financial Management, National Institutes of Health

Leland B. May, Assistant Director of Financial Management (Budget), National Institutes of Health

Charles Miller, Deputy Assistant Secretary, Budget

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NATIONAL INSTITUTES OF HEALTH

BUREAU OF HEALTH MANPOWER EDUCATION

Statement by Director
on
Payment of Sales Insufficiencies and Interest Losses

Mr. Chairman and Members of the Committee:

Four million dollars is requested to cover interest payments to the Treasury Department and the Government National Mortgage Association and for payment of loan cancellations arising from operation of the student loan revolving funds.

These two funds, the Health Professions Education Fund and the Nurse Training Fund, have over the years, from 1968, provided $46,163,000 in loans to students in schools of medicine, dentistry, optometry, podiatry, osteopathy, pharmacy, veterinary medicine and nursing.

The students repay these loans with interest to the institutions and the payments are then repaid to the Secretary for deposit in the revolving funds. However, as these funds have been in operation only since 1968, very little has yet been collected from the students with which to pay mandatory interest payments and other costs.

In Fiscal Year 1972, therefore, the $4 million requested will provide for the following:

(1) Payment to the Treasury Department of $2,319,000 interest on appropriated funds loaned to the schools.

(2) Payment to GNMA of $928,000 interest due to holders of participation certificates issued by GNMA and backed by notes given to the Secretary by the schools.

(3) Estimated payment to the schools of $753,000 arising from the forgiveness and cancellation benefits in the Act relating primarily to the employment of graduates in an area of public benefit.

I will be most happy to answer any questions.

PENDING LEGISLATION TO EXTEND HEALTH PROFESSIONAL AND NURSING ACT

Senator COTTON. You go ahead and summarize it, if you desire.

Dr. ENDICOTT. Mr. Chairman, the health professions and nursing legislation expired on June 30, and bills to extend and improve both have been submitted by the administration. The House and Senate passed differing versions by nearly a unanimous vote, and are now meeting in conference.

Our comments today are based on our ongoing programs and student assistance authorities which have just recently been extended for 1 year, and I would like to make a few comments on some of the major issues relating to the new legislation.

Senator COTTON. Are you now talking about the new authorization?

Dr. ENDICOTT. No, sir. I will talk first about the portion of the appropriation which is already authorized.

Senator COTTON. But you referred to it as new legislation.

Dr. ENDICOTT. I would like to make some comments on the problems relating to the new legislation.

Senator COTTON. You are referring to the new authorization?

Dr. ENDICOTT. I am referring to that portion of the budget request which is already authorized, sir.

Senator COTTON. You used the word new. Go right ahead.

DENTAL HEALTH

Dr. ENDICOTT. The first activity I would like to speak to is the Division of Dental Health. The Division of Dental Health attempts to prevent dental disease through the wider use of prevention measures and through various measures aimed at making dental health manpower more productive.

There are still more than 70 million people in the United States who do not have the basic protection of fluoridation of drinking water and the programs to make good oral hygiene commonplace may be as difficult to achieve as universal water fluoridation. The Division of Dental Health is working on both of these problems.

More than 25,000 dentists now in practice have had training in the greater use of auxiliary personnel. The next step is to make even further gains in this area.

In our Manpower Development Center in Louisville, Ky., the Division of Dental Health has shown that if dentists use four well-trained auxiliaries and if the auxiliaries' functions are extended beyond those functions previously carried out, the individual dentists' productivity in terms of patient care he renders can be more than doubled.

We want to translate these Louisville findings to general application and the first step is to introduce these new techniques into the curriculum of denal schools. We refer to his program by the acronym TEAM, which stands for "Training in Expanded Auxiliary Management." It was handy that it came out that way.

It is a program which was developed at the Louisville Center and which will now be extended into the curriculum of the dental schools.

We began with seven schools during the last fiscal year and in the coming fiscal year we will extend this to eight additional dental schools. After that, we expect to accelerate the pace and have it in the curriculum in all schools, hopefully in the next 3 or 4 years.

ALLIED HEALTH

The next area I would like to mention is allied health. The allied health legislation was extended late in the last session of the last Congress and we are just beginning the second year of that legislative cycle. The allied health personnel, as we define them, number approximately 900,000 in the United States. This represents almost a doubling of the number of people in this field since 1960. It is expected that it will increase at least 50 percent again in the next decade, perhaps more. This we look upon as offering perhaps one of the most immediate partial solutions to manpower shortage since these people do not require the lengthy training of the physician or the dentist.

In the field of allied health, the primary funding for education is derived from non-Federal sources. Our program is largely a stimulatory program for innovation and improvements rather than in basic support of the education itself.

We have proposed in this budget to shift our method for distributing the limited institutional support we do provide from the formula grant mechanism to the more flexible special improvement grant mechanism by comparative transfer of funds from one to the other.

We are expanding the program for MEDIHC which is operated in collaboration with the Department of Defense, the purpose of which is to encourage men and women who have had training in medical work in the military to enter civilian health careers when they leave the military service.

Those who seek immediate employment are helped to find a job and those who wish to have additional training are helped to find that training through this program.

In the field of public health——

PHYSICIAN ASSISTANTS

Senator COTTON. Before you leave the allied health portion of your statement, does it meet with your approval if we ask a question or two as you complete the subjects?

Dr. ENDICOTT. Yes; certainly, any way you wish to handle it.

Senator COTTON. In utilizing these people, whether you call them assistants or whatever term you may designate them, is it the plan to have them work out of medical centers or what is the general plan of organizations?

Dr. ENDICOTT. If you are speaking now of physician assistants, which is a new term——

Senator COTTON. Start with that; yes.

Dr. ENDICOTT. There are several different types we talk about.

The one most of us are most familiar with is the type of physician assistant who is highly trained in a very limited special field. These may be trained in laboratory techniques, that sort of thing. They generally work in an institutional setting as assistants to specialists, the orthopedic specialist, the assistant specialist, and so on.

GENERALIST ASSISTANTS

There is another category which is trained more broadly but is not thought to be capable of independent duty. This sort of person works as an assistant to a generalist but usually under the direct supervision of the physician or the dentist, either in his office practice or, less commonly, in an institutional setting.

INDEPENDENT CORPSMAN

Then there is a third type and the prototype for this type is the independent duty corpsman, for example, in the Navy, who may be stationed on a small ship and be the only source of medical care on that ship. His training is more extensive and he is capable of providing a number of medical services which would ordinarily be provided by a physician if a physician were available.

So, in general, there are these three categories.

It is this third category that is being emphasized in a program such as the MEDEX program which was originated in Senator Magnuson's State in which the MEDEX or physician assistant works in collaboration with a physician who is practicing in a rural area. A MEDEX may be located 50, 100, 150 miles away in a relatively small town. He works under the general supervision of a physician and gets a lot of his advice and direction and consultation by telephone.

Senator COTTON. You interest me especially on this because we all recognize the situation in the crowded slums and congested areas—I won't call them ghettos—of the city for the need of delivery of more medical services.

I represent, as of course you know, a State that is largely rural and we have terrific problems in many, many small communities where not only is there not a physician but there is not a nurse available. In other words, as I said the other day, not just a few but many cases of people with heart attacks loaded in an automobile, rushed 25 or 30 miles to the county seat hospital, dead on arrival because there was no one there to do the necessary emergency things, whatever is necessary to keep the heart going until they get to the hospital.

So, it represents a very, very critical need.

I expect people can be educated to avail themselves of the services of these medical assistants. So, I find that the people who have the least means of access to a doctor are the ones who have the highest demands and sometimes it is difficult for them to accept help from somebody else even for minor ailments.

However, if this sort of system is going to be developed, it is going to require some State law; isn't it?

Dr. ENDICOTT. Yes, sir; that is one of the problems.

LEGAL LIABILITY

Senator COTTON. I don't know what the situation is on the legal liability.

We had some medical centers in the rural communities that they built or renovated and prepared quarters for a doctor being there once a week and bought equipment, X-ray machines and various things, at great sacrifice.

Under State law, no center at that time could be conducted unless it was under the administration of a hospital. And the hospital flatly refused to be responsible for some physicians in an isolated town who would get advice and direction from their institution and from their clinic.

No clinic or no hospital would assume that jurisdiction because of the possible liability. So, the whole plan came to an abrupt standstill of getting hospitals to send interns into some of these places for 1 day a week or something. They just simply would not do it.

Now, what is your approach to this?

What do you visualize in making use of these allied personnel?

CONCERT OF ACTION BY FEDERAL GOVERNMENT, HOSPITALS, HOSPITAL ASSOCIATIONS, AND MEDICAL PROFESSION

Dr. ENDICOTT. I think, Mr. Cotton, this can only work if there is concerted action and here I think we need the concerted action of the Federal Government, of hospitals, of hospital associations, of the profession.

We are going to have to modify licensure laws. We may have to take another look at liability and malpractice laws and insurance because all of these play a part in preventing the provision of services in remote areas utilizing trained personnel but with less training than that of a physician.

Now, our principal concern, of course, is training the auxiliary personnel and training the physicians and dentists how to use them. But that will not solve the problem unless the medical practice acts of the States are adjusted in such a fashion to make this possible. It won't work unless the medical profession is willing to utilize this device. It won't work unless the hospitals cooperate, and it won't work if the public does not accept it. All these things have to be attacked.

REPORT TO CONGRESS ON LICENSURE CERTIFICATION: POSSIBLE MODEL LAWS

We are participating in the preparation of a report to the Congress on questions of licensure certification, accreditation; hopefully this may lead to some model laws.

I think it has to be considered in framing the laws and the regulations in reimbursement under medicare and medicaid.

We are working with other parts of the Federal Government, with the professional societies, attacking it any way we can.

As I say, our principal role in this is an educational role of the assistant on one hand——

MALPRACTICE SUITS: PRACTICAL OBSTACLES

Senator COTTON. I can see where they can be very helpful when they are working with the doctor and everyone who comes in with a sore finger does not have to necessarily see the physician.

But, as a young lawyer, I worked 5 years for a firm in my State that defended all the malpractice suits. My job as a junior in the office was to go out and help prepare the case and sit in on the trials. I was the one who went out and talked with the physicians and interviewed the witnesses and took the statements.

I have been impressed through the years since the mortal terror and justifiable terror that the medical profession and hospitals have because of the blow to their professional prestige and publicity attendant on these cases.

I can see how this could work out with dentists and the nursing profession and we are trying to deal with many, many people in this country who are deprived of services of physicians unless they are taken miles away, or in the crowded congested areas of the cities where there just aren't enough doctors to go around.

It seems to me you have some almost insurmountable obstacles.

Dr. ENDICOTT. I think there is a general awareness of the magnitude of the problems to the extent that I think we both heard the President and Secretary Richardson and Mr. Veneman openly discuss the question of the Federal Government's overriding stake in terms of licensure, accreditation, malpractice insurance and so on. That is going pretty far. It would have been unheard of to discuss this when we were both a little younger.

So, I think that is an evidence of the concern which people in many high places have over these problems.

Senator COTTON. I doubt if either the President or the Secretary, with all profound respect to them, have had very intimate contact with country doctors in some of our remote communities. But you go ahead.

PUBLIC HEALTH

Dr. ENDICOTT. The next program I would like to discuss had its authority extended in the last session of the last Congress, and is in the field of public health.

Our program for public health manpower development actually is our oldest program. It dates back to the 1950's. It is focused on public health and training of personnel for those purposes. This deals with all segments of the population.

I think perhaps the most spectacular change in this field over the last few years has been a gradual shift in the direction of increasing concern with organizations for the provision of health services and with providing personnel to be involved in environmental aspects of public health, the kind of people who would be needed, for example, to establish standards and to apply them, police them at the national, State and local level.

The budget, itself, is essentially the same level as last year.

MANPOWER INTELLIGENCE

The next thing I would like to speak to is a new activity in the Bureau.

During the past year, we have established a new division called the Division of Manpower Intelligence, which serves as the focal point in the Federal Government for collecting, developing, analyzing, reporting, and interpreting health manpower data, not only with regard to Federal programs but the whole picture.

This new division, still in the process of being developed, we hope will provide us with more accurate statistical analytical data on which the Congress and the administration can base action, programs, budgets and the like. We are asking for some additional personnel in order to develop this division.

REGIONAL ORGANIZATIONS

Another item I would like to speak to is to the question of our regional-organization portion of the national Institutes of Health, which operates through regional offices.

Our staff in the regional offices at the present time are largely members of the Division of Nursing and the Division of Dental Health.

These are carryover programs which were transferred into the Bureau when the Bureau was created.

We are in the process now of developing manpower expertise in the regional offices, and have requested additional positions for that purpose.

STUDENT ASSISTANCE

Finally, student assistance.

As you know, the House and the Senate have recently extended the old legislation for 1 additional year in order to take care of the students who would be entering as freshmen this fall.

We have acted already on the basis of the new legislation and are in the process of getting the awards out. The level is the same as in 1971, and we estimate that the number of students who will be provided loans or scholarships will be about the same, although the actual number depends on the decisions of the many schools involved, since they set the level of the stipend, and therefore they adjust the number of students who may be assisted within the ceiling.

PENDING HEALTH MANPOWER LEGISLATION: 1973 INCREASED ASSISTANCE

Senator MAGNUSON. What do you mean on page 6, "If legislation being considered now is enacted, it would take the place of the extension in fiscal 1973"? What are you talking about, the health manpower bills?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. That are now in conference?

Dr. ENDICOTT. Yes, sir. The Senate and the House versions are essentially identical, except that the Senate bill is a 5-year bill and the House bill is a 3-year bill.

Senator MAGNUSON. If the legislation now in conference is enacted, would that increase the number of trainees?

Dr. ENDICOTT. It could.

Senator MAGNUSON. It could? I mean, of student assistance?

Dr. ENDICOTT. The authorizations are higher than they have been. The top level in both bills is higher. The Senate version, in addition, adds a new authority to the Office of Education, for guaranteed loans under that authority. So that, depending on the appropriation, substantially more students could be aided.

Senator MAGNUSON. Even if you kept the same level, you would have to have, regardless of what comes out of the conference, more appropriation, because both levels are higher, are they not?

Dr. ENDICOTT. Yes, sir. We would have to have more money in 1973 to stay at the same level.

Senator MAGNUSON. If you are going to increase it, that would add more?

Dr. ENDICOTT. Yes, sir.

SUGGESTED 1972 SUPPLEMENTAL REQUEST

Senator MAGNUSON. Say that is enacted, which I think the conference will report here in the next, I understand probably the next week, the first of next week, and it will go down to the White House and I think the President will sign it, he is strongly in favor of the whole principle, why do you say you will wait until 1973?

Obviously, we can't appropriate here until they have the new bill. But why wouldn't you prepare yourself to put some of this in a supplemental when we come back—if we ever get away—when we come back right after Labor Day?

Dr. ENDICOTT. Well, it is a question of timing.

Senator MAGNUSON. Wouldn't you be ready then to do this?

Dr. ENDICOTT. No, sir. The problem here is that the students who are entering in September have already been admitted. Arrangements need to be made right now as to what stipends and scholarships they can get.

After examining what will have to be done to set up the new system, it was obvious we could not get the new system operating in time for them to know whether or not they were going to get scholarships and therefore decide whether or not they could go to school in September.

So, although all of us, I know—the Bureau, the Secretary, the President, the Office of Management and Budget, the Congress—all said the sooner we can do this the better, there are the practical realities of timing which make it necessary to postpone activating the new program for a year.

CONCERN OVER HEALTH MANPOWER

Senator MAGNUSON. What I am trying to say is that we are all concerned about all these shortages. Here we are trying to do something about it. With the cooperation of you people, the administration, and Congress and everyone else. And, as you say, the quicker the better; some of these programs can start in January, some schools, particularly a school that has the semester plan.

Dr. ENDICOTT. If it is possible to do this, I am prepared to seek permission from higher echelons to ask for a supplemental if it looks as though we can activate the program in midyear. I don't know whether we can do it from a technical standpoint.

Senator MAGNUSON. At least it would not be the same amount as the full thrust of the 1973 budget.

Dr. ENDICOTT. That is correct.

Senator MAGNUSON. But it might be a little that would get some of them started and keep these programs moving.

Dr. ENDICOTT. Yes, sir.

DISTRIBUTION OF FUNDS TO SCHOOLS

I might take a moment to explain the problem. The present formula for distribution of money to the schools is a simple one. It is based on just a nose count of the number of students enrolled in the school. The new legislation takes into account some new factors: the income background of the student and his own income or financial status.

Now, in order to obtain the necessary information to divide the money amongst the schools, this means that we have to make inquiry into the financial status of every student and his family background and the turnaround time we felt was simply not adequate to get this going in time for September. It is possible we might be able to accomplish this for the second semester.

As I indicated, I would be prepared to ask authority to move; and I know that everyone involved here is trying to do the same thing. I would not be pessimistic about being permitted to approach you if it is feasible.

Senator MAGNUSON. I hope you will take a look at this because Congress wants to keep the current programs moving and get the new ones started.

Dr. SHERMAN. I don't think there is any doubt of that. It is the question of timing and the technicalities——

Senator MAGNUSON. I understand that. Let us not think of why we can't do it. Let us sometimes think maybe we can do it, and let us see what we can do.

It would not be the full program but it might make a small start. There you might get the experience in applying formulas to the few that you could get to in the second semester.

Dr. SHERMAN. That January date, as you pointed out, becomes the next important date.

ENACTMENT OF LEGISLATION

Dr. ENDICOTT. The critical date from our standpoint in making a beginning is the final resolution of the legislation, itself, so that we know what information we have to collect. As soon as we get that, we will go to work, I assure you.

Senator MAGNUSON. I think you will have it before we leave here in August.

I understand that the conference is not too far apart and there is not too much trouble. They are in conference today and they hope to finish very soon.

Dr. ENDICOTT. Yes, sir.

Mr. MILLER. Mr. Chairman, you realize that Dr. Endicott's remarks don't apply to the entire bill that is in conference. He is only talking about student assistance. We will definitely be back for a supplemental for the major portions of that bill.

INSTITUTIONAL SUPPORT

Senator MAGNUSON. That is good. I am glad to hear that.

What is the story on institutional support on medical, dental, and related health professions and the nursing institutional support for which the latest budget revision asks for nothing?

Dr. ENDICOTT. We cannot estimate the budget on institutional support until we know what the formulas are going to be.

Senator MAGNUSON. You are waiting for the same legislation?

Dr. ENDICOTT. Yes, sir.

Mr. MILLER. Actually, there is provision for this in the President's budget, Mr. Chairman. But, as the committee wishes and as the House wishes, we are not requesting that you appropriate funds at this time.

Senator MAGNUSON. The money goes up considerably here.

For instance on the medical, dental, and health professions, the budget suggests if the bill was passed an upping from $147 million to $256 million. On nursing, from $11 million to $18.2 million, but all that was predicated upon the administration's proposals.

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. So there is a considerable amount to get moving. If you could get moving, you would have to come up here and get some supplemental.

Dr. ENDICOTT. Yes, sir.

The legislation sponsored by the administration in the case of the medical schools would have increased the formula grant to the medical schools from approximately $500 per student to approximately $1,500 per student.

The bills in the House increased that and the bill in the Senate increased the House.

We don't know, of course, what the conferees will come out with.

Senator MAGNUSON. You have been around long enough, Ken, that you know you can just about almost bet it will be right in between.

Senator COTTON. The fact that most medical schools are in financial straits, has prompted the inclusion of direct benefits from the Government in proportion to the number of new students that they take in—that is correct, isn't it?

Dr. ENDICOTT. Yes, sir; that would be true in both House and Senate bills.

Senator COTTON. That being true, would, I think, tend to make these medical schools more cooperative and a little more elastic in giving you a little leadtime. They might even take students a few weeks late or they might take them starting the second semester. They would be eager enough to get the benefit so that you might well be able to speed up the time of action even though you did run right to the first of September.

IMPACT OF NEW LEGISLATION

Dr. ENDICOTT. These programs are forward financed. The institutional grants have already been awarded in support of the coming academic year from last year's appropriation. So, the new legislation, although you would be appropriating money for fiscal 1972, the schools would have it to spend beginning July 1, 1972, corresponding to our fiscal 1973.

I think one can expect to see the impact of the new legislation on the entering class a year from this fall and I expect it to have a major impact, whichever version it is.

Senator COTTON. The schools could not benefit until July 1972.

Dr. ENDICOTT. That is correct.

Now, enrollments are being increased very substantially this September as a ressult of institutional support and special projects grants. The number of entering students in all of these disciplines we are talking about have been substantially increased over what it was the year before.

Senator MAGNUSON. What do you mean by substantial?

Dr. ENDICOTT. In the case of medicine, the entering class this fall will be approximately 700 more students than it was a year ago. This is almost a 10-percent increase. So, they are moving significantly.

Senator MAGNUSON. It is not substantial when you consider we had a goal of trying to get $1,500 2 years ago and we found out we ended up with $536. So, now, we are going to have $700 more. So, we are still $300 behind our goal of 2 years ago.

Dr. ENDICOTT. We are about a year late.

Senator MAGNUSON. That is what I was going to say. We are about a year late. That is why I want to keep moving on this and push it.

Dr. ENDICOTT. So do we, sir.

Senator COTTON. Do the two bills that are in conference specifically exclude the application to the school year that starts in September?

Dr. ENDICOTT. No, sir; I don't think there is anything in the language of the bill which would do that but I assume it was by mutual agreement, the launching of the program.

I was not in charge of the program when it started, but I assume there was agreement between the administration and the Congress that this would be forward financed. There are a number of practical reasons why it should be.

Senator COTTON. It would be forward financed if we gave you the money and you produced the student.

I still say that these schools are going to derive a direct benefit in proportion to the number of students. I can even visualize their starting beginners in the second semester even though they eventually graduate in the middle of the year.

ADMISSION TO MEDICAL SCHOOLS

Dr. ENDICOTT. There is at least one school, the University of Tennessee, which does admit two classes each year.

I am not aware of any school which is proposing to initiate such a program this year but I can assure you that we would not pass up any opportunity to get additional students admitted to the health professions schools.

If the opportunity presents itself and this requires some special action, I am prepared to do everything I can to take that action. If we can handle it by shuffling our budget, we will do that. If we can't, then I will turn to Dr. Marston and the Department for help.

I must say there has been no indication at any time in this area that I would not be supported. I have had full support in this effort.

Senator MAGNUSON. Ken, you don't need another act.

Dr. ENDICOTT. No, sir. I might need some extra money.

Senator MAGNUSON. If you get the money, you can go ahead and get at it as fast as you can.

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. If you can't, why, the money is there, anyway.

Once in a while, you have money you can't spend. You can just leave it there. I have never seen a department that had a nickel left by June 30 of any given year.

What we are trying to say is that if we are going to get at this whole health manpower thing as far as student assistance is concerned, we just have to get going. If we can get something started in January, we ought to get it started.

I understand the full thrust of the bill will be for fiscal year 1973, the big thrust. But we might be able to get a few steps ahead in January and get it started if you have the money.

Dr. ENDICOTT. That is right.

We established a precedent in this past fiscal year for departing from forward financing in order to meet an emergency. The emergency related to threatened or impending bankruptcy of some medical schools. So, we utilized fiscal year 1971 funds to make awards in fiscal year 1971 for expenditure in fiscal year 1971. So, we have done this; we can do it; we will do it if it appears appropriate.

I can assure you I will be banging on someone's door if I need more money for this purpose.

MEDICAL SCHOOL GRADUATES

Senator MAGNUSON. You had better come up here, too.

Of course, now all we did is have a simple extension of the existing authorizations, student assistance, so that we can work under that. The other one will be along later. I am getting impatient about getting going in this field. We talked a lot about it. We thought we were going to have at least, which is a small number, 1,500 more enrolled in the medical schools. You remember we talked about 1,500, 2 years ago. Then we found out we only got something like 536. Now we are going to have 700.

We are still, as I pointed out before, we are still 200 to 300 behind. We are not keeping up.

Dr. ENDICOTT. I think, Mr. Chairman, that we can probably achieve a 50-percent increase in graduates by 1976.

Senator MAGNUSON. Under present legislation?

Dr. ENDICOTT. With the legislation which is pending.

Senator MAGNUSON. You are down to this extension?

Dr. ENDICOTT. Yes, sir.

I have completed presenting that portion of the budget which does not require legislation.

LOANS TO MEDICAL STUDENTS

Senator MAGNUSON. Student loans, you say, will assist 22,400 students in the health professions; 24,000 in schools of nursing; approximately 18,300 in the health professions; and 17,000 nursing students will be helped by scholarship grants in this extended legislation.

Now you are talking about the extension?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. Not the other bill.

Approximately 2,000 nurses will receive long-term and 1,900 short-term intensive training?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. The students who successfully complete their education and practice in designated shortage areas can have their loans completely canceled?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. That is quite important, isn't it?

Now, who designates the areas?

Dr. ENDICOTT. The Secretary designates the areas on the basis of our advice.

Senator MAGNUSON. And based upon facts and figures?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. We have a 1-year extension of this program.

Senator COTTON. There are six or eight medical schools that have only a 2-year course and then the students have to chase around the country and find some school that will admit them for the last 2 years.

Dr. ENDICOTT. Yes, sir.

Senator COTTON. In the pending legislation, there is a provision that would help those six or eight schools, one of which is my own school up in Dartmouth. I am deeply interested in it. It is in the Senate bill and I understand the House is going to kick it out so that is discouraging; it is bad news for me.

CONVERSION OF 2-YEAR MEDICAL SCHOOL

Dr. ENDICOTT. Well, sir, we had authority under the old legislation and have authority under the new legislation through construction grants and through special projects to assist schools to convert from 2 to 4 years. As you know, we have provided a grant to Dartmouth to permit them to change to a 4-year school. They are not ready to do that yet; they don't have the buildings yet. But they would be eligible and I am sure would receive assistance whether the Senate provision is included or not. There was authority to do that in the special project.

Senator COTTON. That is in writing; isn't it? It is right on the record?

Dr. ENDICOTT. Yes, sir.

There is a place for the 2-year school since a number of medical schools can handle more third- and fourth-year students than they can handle first- and second-year students.

Although it imposes some hardships and difficulties on the students in finding a place, this is increasing because there are so many changes in curriculum it is becoming almost necessary for the 2-year school to decide which 4-year school a student is going to transfer to in order to be sure they get the right courses in the first 2 years.

But, given all those difficulties, there is a place for 2-year schools. I would not want to try to force all of them to change.

Senator COTTON. We used to have evidence in the past, 4 or 5 or 6 years ago, or maybe longer than that, time goes so fast, that that was the case. Quite a percentage of students gave up or failed the first 2 years so there were slots available for those who survived the first 2 years to get into the third and fourth years.

But the deans of these schools now say that this is no longer true. They have a very, very small percentage who enter the first 2 years who wash out.

Dr. ENDICOTT. They are doing a better job of selection and a better job of teaching, I think.

Senator COTTON. So, there are more of them that have to find the slot in the third and fourth years?

Dr. ENDICOTT. This is particularly relevant to your school, Dartmouth, which, by and large, sends its students on to the big Ivy League schools in Boston and New York City, especially, Philadelphia and Baltimore.

I have discussed this question with the deans in the schools in Boston, New York, Philadelphia, Baltimore. Almost without exception, they could accommodate 50 to 100 percent more junior and senior students than they have space to accommodate freshmen and sophomores. So, there are places for students to go from a 2-year school.

Mr. Chairman, I did want to mention the Nurse Training Act is also in the process of being extended.

Miss Scott has left her bed in order to be here, if you would like to call on her about anything in the nurse field.

Senator MAGNUSON. We will be glad to hear from her.

Have you finished your statement?

Dr. ENDICOTT. Yes, sir; I have.

FINANCIAL DISTRESS

Senator MAGNUSON. Was there any discussion here? You have some new figures.

I would like to ask one or two questions first before I go over.

One hundred and nine health professions schools have applied for and received funds because of financial distress. What was that total?

Dr. ENDICOTT. That is on the order of $43 million. In medicine, $26 million; osteopathy, $1.5 million; dentistry, $13 million; optometry, $816,000; podiatry, $123,000; pharmacy, $109,000; veterinary medicine, $543,000; for a total of $42,858,000.

Senator MAGNUSON. So, for 109 individual schools, we did give out emergency funds of $43 million?

Dr. ENDICOTT. $43 million.

Senator MAGNUSON. $43 million?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. That was only for a temporary period, was it not? It was to tide them over or something.

Dr. ENDICOTT. That was for a 1-year period; yes, sir.

Senator MAGNUSON. That runs out, does it not? Or is that for next year? No; that runs out.

Dr. ENDICOTT. The awards were made in May for this coming year. They are actually spending the funds right now.

DISTRIBUTION OF HEALTH MANPOWER

Senator MAGNUSON. And these are some new figures on the distribution of manpower—of course, we all know there is a shortage—there are 130 counties with no doctor, 225 with no dentist. Each year more counties join the list.

This is why we want to encourage these people that we are going to give student assistance to; this is why we say we will cancel the loan if they will go into those types of areas; is that correct?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. And in the inner cities?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. What is being done about training for the practice of family medicine. Do you make any distinction there?

Dr. ENDICOTT. Yes, sir. We have awarded special projects for this purpose.

I think this program certainly will be intensified under the new legislation.

Although there are some differences in the administration's proposal and the House and Senate, all three agree that this should be emphasized by supporting not only the people who are being trained but also provide training expenses to the institutions who will provide the training.

This, I anticipate, will be one of our high priority programs in the coming years.

Senator MAGNUSON. In an effort to reverse the trend, if you can?

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. I think, I am not sure, I will have to check on this, but I think the new bill allows an administrative policy to function very well to offer more incentives if they will work in the family doctor field.

Dr. ENDICOTT. Yes, sir.

Senator MAGNUSON. One is the cancellation of the loan.

Dr. ENDICOTT. The other, of course, would be subsidy of their training.

Senator MAGNUSON. Now, whether we are going to do it or not, I think you can do it under the bill if that became the policy, but I will have to check on that and see.

Dr. ENDICOTT. I think you are correct.

Senator MAGNUSON. Now, Miss Scott, we will be glad to hear from you.

I think what we had better do, Miss Scott, is take another seventh-inning stretch so I can get over and vote and then I will be right back.

(A brief recess was taken.)

DIVISION OF NURSING

STATEMENT OF MISS JESSIE M. SCOTT, DIRECTOR

DIVISION RESPONSIBILITY

Senator COTTON. The subcommittee will be in order.

The subcommittee is pleased to have Miss Jessie Scott with us today. Miss Scott, Director of the Division of Nursing. We would like to hear from her at this time. We will enter your biography in the record.

(The biography follows:)

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Bureau of Health Manpower Education

Biographical Sketch

NAME :	Miss Jessie M. Scott
POSITION:	Assistant Surgeon General, Public Health Service Director, Division of Nursing
BIRTHPLACE:	Wilkes-Barre, Pennsylvania
EDUCATION :	Diploma (R.N.) Wilkes-Barre General Hospital School of Nursing, Wilkes-Barre, Pa. B.S., University of Pennsylvania, Philadelphia, Pa. M.A., Columbia University, New York, N. Y.
EXPERIENCE :	Director, Division of Nursing, 1964 - present Deputy Chief, Division of Nursing, 1957 - 1964 Nurse Consultant, Division of Nursing, 1955 - 1957 Counselor and Assistant Executive Secretary of the Pennsylvania Nurses' Association for six years. Served for several years as Educational Director of Mt. Sinai Hospital School of Nursing in Philadelphia and taught at Jefferson Medical College in Philadelphia, at St. Luke's Hospital in New York City, and at the University of Pennsylvania.
ASSOCIATION MEMBERSHIPS:	American Nurses' Association National League for Nursing Chairman, Awards Committee Member, Search Committee American Public Health Association
AWARDS AND CITATIONS :	Sesquicentennial Award from Indiana University School of Nursing for distinguished service to nursing. Awarded the Meritorious Service Medal of the Public Health Service for "outstanding contributions to nursing in this country and other parts of the world." Honorary membership in Sigma Theta Tau National Honor Society of Nursing. Pennsylvania Nurses' Association Award for distinguished service to nursing.
PUBLICATIONS :	"Three Years With the Nurse Training Act." "Seeing Nursing Activities As They Are." "Nursing in India."

Miss Scott. Thank you.

I appreciate the opportunity to appear before you to discuss the efforts of the Division of Nursing.

We are keenly aware of nursing's responsibility for making a major contribution in meeting the health care needs of the American people.

Our role is to provide a focus in the Federal Government for programs designed to increase the nurse work force and to improve the quality of care nurses give patients. Our program strives to improve nursing education, practice, service and research.

Much has already been accomplished to increase the supply of well-trained nurses and to provide increasingly relevant training to meet today's nursing care requirements. The shortage of nurses, and most particularly those with specialized preparation, continues to be a problem of urgent proportions. We have concentrated our efforts on four major points.

TRAINING FOR PRIMARY CARE RESPONSIBILITIES

Nurses have knowledge and capability not only for assisting physicians to provide patient care but for delivery of primary health care in collaboration with physicians.

The capacity of physicians to provide comprehensive care to larger numbers of people can be significantly expanded through the use of specialized nursing care of patients in hospitals, in physicians' offices, in school, in industry, and in the patient's home. More nurses need to be trained to assume these primary health care responsibilities.

With Division support, the University of Mississippi is preparing nurses to care for mothers and children from low-income families, and has instituted a course leading to a certificate in nurse-midwifery.

In Colorado, a physician who had previously closed his practice to new patients added a pediatric nurse practitioner to his office force; as a result, he increased his patient load by 35 percent.

In a small community in Pennsylvania, a nurse assisting a family practitioner helped him extend his services into community and occupation health areas.

There are other types of nurses who have assumed new functions and levels of responsibilities. For example, the Loeb Center in New York, staffed exclusively by nurses, gives round-the-clock nursing and rehabilitation care to patients who have undergone surgery or other hospital treatment.

Some family nurse practitioners are the first health worker to see a patient and administer to patients' needs in the environment in which they developed.

We plan to emphasize preparation for primary care services in the coming year.

TRAINING FOR TEACHING AND LEADERSHIP

The quality of nursing care is seriously threatened by a critical shortage of nurses prepared to teach.

In 1970, there were 1,407 unfilled budgeted faculty and administrative positions. Additionally, more nurses need to be prepared to direct and supervise others and to give specialized care such as is required in many modern lifesaving procedures.

TRAINING FOR MODERN NURSING

The Division is assisting nursing education to keep abreast of the rapid strides being made in medicine and technology and at the same time train nurses for the therapeutic, rehabilitative, and health-maintaining, health-promoting nursing practices that modern care encompasses.

In Washington State, in the first nursing consortium, four colleges are collaborating to enable nursing students to take their course work in a college close to home and their clinical experience at a nursing center in Spokane.

RECRUITMENT

In less than 5 years, the Division has developed a major thrust to recruit persons who have not formerly considered nursing as a career. Young people of financial, educational, and cultural need are being identified, and given remedial and tutorial assistance to enable them to complete nurse training. Ten contracts have been awarded to attract high school students from ghetto areas—blacks, Mexican-Americans, and inner-city youth.

To recruit men, the Division is supporting a project in New York City to train retiring police and firemen to become registered nurses. Career-ladder educational programs supported by the Division are helping licensed practical nurses to become registered nurses. In summary, the future availability of nurses who provide continuity of care will be a critical factor in the success of health care.

I thank you for the opportunity to appear before you today and I will be pleased to answer questions.

Senator COTTON. Thank you, Miss Scott.

I understand you were ill and left a sick bed to come here today.

Miss SCOTT. That is right. I had some surgery at the naval hospital. This kind of first-hand experience has given me a different concept about medical practice than I had before.

I am deeply committed to the kind of things that nurses can do as well as the need to have a real good surgeon to take care of you.

Senator COTTON. I am sorry you had to wait so long. I am sure that if the chairman had known that you just came from the hospital to testify he would have worked you in sooner.

I will try to be very brief in the couple of questions I have.

Miss SCOTT. I appreciated all the things I learned today from the testimony of others.

SERIOUS NURSING SHORTAGE

Senator COTTON. I have been learning on this committee for 12 years now. As you can see from some of my questions, I haven't learned very much.

We have heard much testimony from outside witnesses in regard to serious shortage of nurses in the country.

Do you have any estimates about the actual size of this shortage? Can you furnish it for the record?

Miss SCOTT. We do have; we have looked at the kinds of nursing care requirements across the country in our institutions, in our public health agencies and we estimate the shortage to be about 157,000. We need 157,000 nurses in 1971 to take care of the requirements.

BUDGET REQUEST REDUCTION

Senator COTTON. Now, the formal request here is reduced by $6,500,000. In other words, the 1971 figure was $73,276,000 and the request, the budget request, is $67 million.

Do you approve of that reduction?

Miss SCOTT. I think that the reduction, Mr. Chairman, is the result of the planned consolidation of the construction programs in the Bureau and what was planned to be a phasing-out of the student loan program.

These two activities together with some increases that are affecting the Division budget brought about that decrease.

The extension of the student loan program and the possibility of——

Senator COTTON. So that, this is a bit misleading as to the damage it might do to the program?

Miss SCOTT. It is an arithmetical kind of manipulation.

Dr. ENDICOTT. We will have to come back to you, Mr. Cotton, with a new budget.

Senator COTTON. In the supplemental.

SOURCE OF NURSING SCHOOL FUNDS

Do nursing schools receive funds from the Office of Education or the Department of Labor?

Miss SCOTT. As I understand, Mr. Chairman, under the Higher Education Act, the funds do go to institutions of higher education and to the extent to which those dollars are supportive of that institution they may be supportive of the nursing program in proportion.

Vocational educational funds can be made available for the associate nursing programs. The extent to which this has occurred is not very great.

We have some information that in 1969 about $2.5 million was identified as going to the junior college programs and there are over 400 such nursing programs in the country.

I don't know of any moneys going to the nursing schools from the Department of Labor.

MAIN SUPPORT FOR NURSING PROGRAM

Senator COTTON. So that this bill is the main support for your nursing program. There are some contributions?

Miss SCOTT. Very small, in terms of the total number of nursing schools in the country.

Senator COTTON. Now, just one question.

Refresh my mind.

I asked an outside witness about this.

PATTERNS OF NURSING EDUCATION

You have, one, the nurses who are being trained in universities, for the baccalaureate degree.

Miss SCOTT. That is right.

Senator COTTON. Two, you have nurses trained in hospitals, nursing schools connected with hospitals, and three, community colleges.

Miss SCOTT. Yes. There are three basic patterns of nursing education.

Senator COTTON. For the ones who go to the baccalaureate degree the training is longer?

Miss SCOTT. It is a 4-year or a 4½-year college program.

Part of the curriculum requirement is general academic training and the rest of it is nursing practice.

Senator COTTON. They go largely into teaching in institutions?

Miss SCOTT. The graduates of the baccalaureate program are prepared to work in the community setting and in school health in contrast to those who come down diploma and junior college programs who are more specifically trained to work in hospitals.

The baccalaureate graduate has an opportunity to work in community settings as well as institutional settings. They are prepared to move into leadership positions and teaching positions.

AUXILIARY NURSING PROGRAM

Senator COTTON. Then you have the program of auxiliary nurses that are not registered nurses; they are practical nurses.

Miss SCOTT. And nursing aides.

Senator COTTON. I suppose perhaps the most attractive or the most challenging careers for these nurses are with doctors. Is that likely to be the case?

Miss SCOTT. The nurse to work with physicians?

Senator COTTON. The nurses you find when you go to a doctor's office or a group of doctor's offices, the office nurse.

Miss SCOTT. I think it may have to do with the hours they work. I think the nurses are attracted to those jobs where they have an opportunity to manage the nursing care of patients and to participate in the development of the care, to work more closely with patients and their families and the kind of problems in the patient's home environment, the problems that family members have.

Senator COTTON. The nurse in the public service?

Miss SCOTT. That is right.

DUTIES OF SCHOOL HEALTH NURSES

The school nurses, I think, are looking at the kind of things they do with the schoolchildren.

We have a project underway in the State of Delaware where we are looking at the school health records of children in the first and fourth grades in order to develop curirculum changes in the school of nursing so that the nurse can look at the family constellation from which the children come to identify problems early in the game before the child becomes ill.

These nurses work in the family setting. I think they find this very challenging.

REFRESHER COURSES

Senator COTTON. Do you have an organized program to bring back into nursing field nurses that marry and raise families and haven't been nursing for years. Their children are grown up so they might be available. Or, perhaps their marirage turns out to be unfortunate and they are footloose to come back into the field?

Do you have a program for refresher courses for calling on that reservoir?

Miss SCOTT. Yes; we do, Mr. Chairman.

Several years ago, we asked for reprograming authority for some of our dollars to mount a program to bring nurses back to practice. Our data show there are about 300,000 nurses who maintain a license to practice but are not active in the field. So, we set up a program to identify these nurses, to find out the kind of retraining programs they needed, to look for jobs for them at the same time because these nurses need to work in their home setting, and then to establish training programs for them.

This program is an ongoing one.

Senator COTTON. Can you or the budget officers or somebody tell me roughly what amount of money in this appropriation is used for that kind of program?

Miss SCOTT. About $2 million.

Senator COTTON. There is $2 million for refresher courses of nurses?

Miss SCOTT. That is right.

Senator COTTON. Thank you.

We appreciate your testimony. I won't keep you any longer. I hope you continue to convalesce.

Miss SCOTT. Thank you very much.

Senator MAGNUSON. Thank you, Miss Scott.

SUBMISSION OF QUESTIONS BY SENATOR BOGGS FOR ANSWER IN RECORD

Senator COTTON. Senator Boggs who is a very active and a helpful member of this subcommittee has some questions he would like to submit.

Dr. ENDICOTT. May we supply the answers for the record?

Senator COTTON. I will pass them on to you and you supply the answers for the record.

Dr. ENDICOTT. Yes, sir.

(The questions and answers follow:)

1. I note with satisfaction that your proposal for funding in Fiscal Year 1972 is $544,801,000, an increase of nearly $113 million over the past year. There is one project in this area in which I am very much interested. It comes from The Children's Hospital of Philadelphia. As I understand it, you have before you now an amended application seeking an $11.8 million construction grant for the Hospital. Could you tell me the status of that application and the likelihood that it might be funded?

Answer. The supplemental request was reviewed at the Nov. 30–Dec. 1 meeting of the National Advisory Council on Education for Health Professions. The Council recommended disapproval of the supplemental request for the following reasons:

1. The project size and scope were disproportionate to basic education requirements for undergraduate pediatrics.
2. No student increase was involved. Since the application was not based on an increase in student enrollment, it was imprudent to make a larger commitment.

The applicant was informed of this action shortly after the council meeting.

SAN FRANCISCO DENTAL HEALTH CENTER

1. From the testimony of the American Dental Association I understand the building for the Dental Health Center is not complete. What's the problem here?

Answer. The construction of this building has had a number of delays since funds were appropriated in fiscal year 1968. Design problems resulted in some slippage which also had the effect of escalating construction costs beyond available appropriations. Funds were reprogrammed at NIH to meet a $628,000 deficit two years ago. Further delays were the result of the question of possible overlap in research carried out at the Dental Health Center and the National Institute of Dental Research. The Center's function in bio-science and materials investigation have been eliminated and its health manpower education and utilization functions strengthened. In turn, this has enabled the Center to reduce its requirements for special purpose space and thus to plan the facility within available construction funds.

2. Is the present delay due to the lack of equipment funds?

Answer. The lack of equipment funds is causing delay since the design of the facility must include plans for certain built-in equipment. Unfortunately, equipment was not included in the original appropriation for construction.

3. How much is needed?

Answer. It is estimated that $2.5 million is needed to fully equip the new facility. However, $1.5 million would permit the architect to incorporate fixed equipment into the design features of the building.

4. Is that in your budget request?

Answer. Equipment funds are not in this budget. A proposal has been made to the Office of Management and Budget to include $1.5 million for equipment in the fiscal year 1973 budget estimate.

(*Question apparently submitted by Senator Cranston*)

1. Underserved areas educational centers.—Your proposed $45,000,000 health manpower education initiative program places heavy emphasis on area health educational centers to provide health personnel in underserved areas. What incentives will keep graduates in the underserved areas? What part of the $45,000,000 will be spent on these centers and how many will you be constructing? How does this program complement other programs designed to provide health personnel in scarcity areas?

Answer. We strongly believe that Area Health Education Centers will enable us to undertake a new and concerted effort to improve the supply, distribution, and utilization of health manpower in the country, especially in underserved areas. Any plans for placement of these centers will take into account the needs of these areas. We have proposed a forgiveness clause on loans to health professions students who are engaged in primary practice in areas designated as underserved. The proposed program also provides for the training of health professions students in the community environment. Such training will include working in community hospitals, clinics, and in similar settings. The purpose of this training is to provide such students with an exposure to community medicine, what it has to offer, its problems, etc. It is also hoped that such training will attract health professions students to practice in the field of community medicine and to physically locate in the underserved areas in which they have been trained.

We are prepared to commit up to approximately four-fifths of the $45,000,000 referred to above for the support of training to be conducted at area health education centers. We do not plan any truly new construction under this authority; although some funds may be needed for modifications, renovations and conversions.

The centers will be closely linked to other Federal programs, to enable these centers to fully realize all of their potential service to their communities. This would involve liaison with Regional Medical Programs, The Veterans Administration, Comprehensive Health Planning, the Physician Assistant Program, and others.

2. Physician distribution.—Could you tell us the total resources in the 1972 budget for the purpose of improving the distribution of physicians in this country?

Answer. The distribution of physicians is of great importance to us. There are several ways in which we plan to improve the present distribution, for example:

1. We have proposed that loans, with a forgiveness feature, be awarded to students that engage in primary practice in underserved areas. By encouraging students to work in underserved areas it is hoped that a better overall geographic distribution will be achieved.
2. The program is currently considering providing a special priority to construction grant and special project grant proposals from health professions institutions located in underserved areas. Since a significant proportion of

physicians set up their practices close to where they were trained, the expansion of educational opportunities in underserved areas will aid in bringing more physicians (and other health professionals as well) to these areas.

3. Paramedical personnel.—We have heard a lot about the potential of developing paramedical personnel to relieve shortages of doctors. Please describe both what can be done and what is being done to develop paramedical personnel.

Answer. Allied health personnel have been increasingly utilized for a number of years to extend and supplement the services of physicians and dentists in providing health services. As indicated in the summary statement, there are currently more than 900,000 professional and technical personnel serving in about 100 specialties throughout the delivery system. Such professions as Physical Therapy, Occupational Therapy, Medical Technology, Radiologic Technology, and Dental Hygiene are well established and provide significant services in virtually every phase of the delivery of health services.

In recent years, increasing demands for health services and the resultant critical shortage of physicians have made it imperative that personnel resources, both existing and potential, be utilized to the fullest extent possible. Since allied health personnel can be trained in relatively short periods of time to perform important functions to extend and supplement the services of physicians and dentists, they offer considerable potential for improving the delivery of health services.

The budget before you, through the authorities of the Health Training Improvement Act which was enacted last year, proposes to nearly double our efforts to assist in this area on several fronts.

1. Through institutional support we are requesting $10,000,000 for the Special Improvement Grant program, which will assist institutions with established programs for training allied health personnel to improve and expand their efforts.

2. With an increase of $10,250,000 proposed for Special Projects for Experimentation, Demonstration, and Institutional Improvement, we will provide support to States to intensify efforts to encourage and assist returning medical corpsmen to enter civilian health occupations; provide support for the training of physician assistants; and provide support to a variety of other activities related to the training of allied health personnel such as assisting to establish new programs, improve curriculum, and develop equivalency and proficiency examinations designed to facilitate the entrance into health occupations of persons who acquire knowledge and skills in other than formal settings.

4. Capitation grants.—(in S. 934, pending Health Manpower bill) of the proposed $109,000,000 increase for Institutional Support, $46,000,000 is for doubling capitation grants to schools of medicine and dentistry. How many extra doctors and dentists will this train, and how far will it go to meeting shortages of these professionals?

Answer. It is important to realize that S. 934 does not contain a mandatory increase, but there is a strong incentive for expansion contained in a bonus system that provides for additional payments for students representing an increase in enrollment.

We do expect a future increase in medical and dental graduates as a result of present institutional and special project grants. We estimate that there will be a total of 16,400 graduates in 1975–76 as opposed to 13,300 in 1970–71. This is 3,100 additional graduates per year, which represents a significant decrease in future shortages.

5. Student assistance. Are you making any efforts to switch emphasis from grants to guaranteed loans? Are you studying the impact this might have on the overall amount of Health Manpower?

Answer. We are proposing to extend the direct loan program for students enrolled in health professions schools and to increase the maximum amount which these students may borrow under the guaranteed student loan program. Under the current guaranteed loan program the maximum amount the student may borrow is $1,500 per year. The Administration's proposal is to increase this maximum to $5,000 per year for medical and other health professions students and to $2,500 per year for nursing students. To encourage students with exceptional financial need to borrow funds in order to undertake their professional education, it has been proposed that a loan shall be cancelled if a student fails to complete his studies and (1) is in exceptionally needy circumstances, (2) is from a low income background and (3) cannot be expected to resume his studies within two years. We believe that this program of financial assistance will help to insure that a lack of financial resources will not, in and of itself, prevent a person's entrance into a health professions school. While this will not increase the amount of health manpower, it will change the mix of health professions students by increasing the number of students from low income families.

6. *Faculty salary grants.—The National Institutes of Health is proposing to centralize research training faculty salary grants in the Bureau of Health Manpower Education and to make these grants to School Deans instead of department heads. Could you tell us why you are doing this, and what effect this will have on manpower development? We have had tons of mail on this one.*

Answer. We have decided to centralize these grants in the Bureau of Health Manpower Education because these funds are, in reality, a portion of the institutional support given to a school, and we are recognizing them as such. The consolidation of this activity into BHME will give the school administrators increased discretion in the use of these funds.

This is only an internal transfer of the responsibility for these funds. The schools will not be penalized or hurt in any way by this change; we believe it is to their advantage.

7. *Construction.—You are proposing a reduction for Health Manpower Construction from $133,000,000 to $98,000,000. Could you tell us how big your backlog of approved but unfunded Construction is? Is this backlog getting smaller? Why do you feel there is less need in this area of Manpower support?*

Answer. At the present time, we have the following approved but unfunded construction grant applications:

	Number	Federal share
Health research facilities	94	$83,961,625
Allied health	3	7,610,570
Nursing	37	30,635,122
Medical library	3	352,865
Health professions	100	701,671,225
Total	237	824,231,407

The amount requested for construction in the 1972 President's Budget is $113,000,000, of which $8,000,000 is for interest subsidies and loan guarantees. The amount requested for loan guarantees and interest subsidies is sufficient to support $296,000,000 worth of construction, which, if funded through the grant mechanism would require almost $200 million. While there are still schools applying for construction grants, adding to the backlog, this new funding mechanism, in concert with the existing grant procedure could greatly alleviate this backlog and allow a significant number of important projects to begin construction fairly rapidly.

Senator MAGNUSON. I have no further questions of any kind.

Thank you very much.

Senator COTTON. You have been very patient.

(The remainder of the hearing on July 21, on the requests of National Commission on Marihuana and Drug Abuse and the National Commission on Libraries and Information Science transferred to Part 2 to follow hearing of July 22.)

PART 1—Pages 1–826
PART 2—Pages 827–1484
PART 3—Pages 1485–2276
PART 4—Pages 2277–3132
PART 5—Pages 3133–3615
PART 6—Pages 3617–4355

CHRONOLOGICAL LIST

Page

Wednesday, June 9, 1971:

- Department of Labor, Secretary 1
  - Bureau of Labor Statistics 67
  - Manpower Administration 117

Friday, June 11, 1971:

- Department of Labor:
  - Workplace Standards Administration 233
  - Occupational Safety and Health Administration 305
  - Federal Workmen's Compensation Benefits 321
  - Federal Unemployment Benefits and Allowances 343
  - Limitation on Grants to States for Unemployment Insurance and Employment Services 366
  - Bureau of International Labor Affairs 387
  - Special Foreign Currency Program 401

Monday, June 14, 1971:

- Department of Labor:
  - Labor-Management Services Administration, salaries and expenses 423
  - Office of the Solicitor, salaries and expenses 481
  - President's Committee on Employment of the Handicapped 519
  - Office of the Secretary, salaries and expenses 532

Tuesday, June 15, 1971:

- Commission on Railroad Retirement 573
- National Labor Relations Board 615
- National Mediation Board and National Railroad Adjustment Board 659
- Railroad Retirement Board 690

Thursday, June 17, 1971:

- Federal Mediation and Conciliation Service 715
- U.S. Soldiers' Home 749
- Occupational Safety and Health Review Commission 762
- Cabinet Committee on Opportunities for Spanish-Speaking People 774
- Office of Economic Opportunity 795

Wednesday, June 23, 1971:

- Department of Health, Education, and Welfare:
  - Social and Rehabilitation Service:
    - Administrator, testimony of 1086

Thursday, June 24, 1971:

- Department of Health, Education, and Welfare:
  - Social and Rehabilitation Service:
    - Administrator, testimony of 1135

Tuesday, June 29, 1971:

- Department of Health, Education, and Welfare:
  - Social Security Administration:
    - Commissioner, testimony of 1260

Tuesday, July 6, 1971:
  Department of Health, Education, and Welfare: Page
    Nondepartmental Witnesses 1485

Wednesday, July 7, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 1621

Thursday, July 8, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 1743

Friday, July 9, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 1875

Monday, July 12, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 2021

Tuesday, July 13, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 2101

Wednesday, July 14, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 2277

Thursday, July 15, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 2435

Friday, July 16, 1971:
  Department of Health, Education, and Welfare:
    Nondepartmental Witnesses 2747

Monday, July 19, 1971:
  Department of Health, Education, and Welfare:
    Health and Scientific Affairs:
      Assistant Secretary, testimony of 3133
    Health Services and Mental Health Administration 3152

Tuesday, July 20, 1971:
  Department of Health, Education, and Welfare:
    National Institutes of Health 3617

Wednesday, July 21, 1971:
  Department of Health, Education, and Welfare:
    National Institutes of Health 3893
      Related agencies:
        National Commission on Libraries and Information Science 1471
        National Commission on Marihuana and Drug Abuse 1453

Thursday, July 22, 1971:
  Department of Health, Education, and Welfare:
    Office of Child Development 1317, 1346
    Office for Civil Rights 1360
    Departmental Management 1444

LIST OF WITNESSES

	Page
Adams, Dr. Forrest	1744
Aines, Andrew A.	1471
Alexander, Hon. Bill. U.S. Representative from Arkansas	2462
Anderson, Charles W	1508
Anderson, Hon. Clinton P., U.S. Senator from New Mexico	4131
Anderson, Forrest H	2089
Anderson, Dr. Robert J	1891
Apgar, Dr. Virginia, M.P.H	2671
Appel, Charles F	1951
Ashby, Dr. B. R	1987
Atwell, Willis W	1137, 1172
Baker, Dr. Carl G	3636, 3701–3713
Ball, Robert M	1260–1316
Bassett, Julia	2619
Bates, James E., D.P.M	2879
Bax, James A	1103
Bayh. Hon. Birch, U.S. Senator from Indiana	1151
Bechill, William	2076
Benedict, William F	1778
Bentsen, Hon. Lloyd M., Jr., U.S. Senator from Texas	2215
Bergman, Dr. Abraham B	2689
Berman, Dr. Sydney	2021
Bernstein, Dr. Arthur	2918
Besch, Dr.	2337
Betts, Dr. Henry B	2666
Bierman, Dr. Edwin L	1851
Birren, James E	1701
Bliven, Dr. Charles	2780
Bowery, Dr. Thomas G	4124–4132
Boyle, Thomas E	2264
Bradley, Elizabeth	3589
Brady, Rodney H	1447
Brickfield, Cyril	1684
Brobeck, Dr. John R	1820
Brooke, Hon. Edward W., U.S. Senator from Massachusetts	3106
Bucher, William B	1876
Buchwald, Dr. Henry	2206
Bucy, Dr. Paul C	2280
Burkhardt, Dr. Frederick	1471
Burns, Dr. John J	1831
Caniff, Charles	2288, 2313
Cardwell. James B	1444
Carlucci, Frank	795
Castleton, Dr. Kenneth B	2365
Chapman, Dr. Carleton B	2467
Chase, Irving	1566
Church, Hon. Frank, U.S. Senator from Idaho	3075, 3110
Clayman, Jacob	2257
Clifton, Dr. James A	3001
Collins, Rev. T. Byron	1875, 2417
Cook. Dr. Charles D	1733
Cooke, Eileen D	1481
Cooper, Dr. Theodore	3745–3753

Page
Costa, John L. 1110
Counts, J. Curtis 738
Cranston, Hon. Alan, U.S. Senator from California 2118
Crow, Mervin 1596
Cummings, Dr. Martin M 4175–4178
Curnen, Dr. Edward C., Jr 1977

Davey, David M 2729
Davidson, Rita C 2087
Davis, Dr. Dorland J 3975–3993
Doctor, Dr. Jack M 2251
Drye, Robert 1526
Dunkell, Dr. Samuel V 2715
Dunphy, Robert G 2214
DuVal, Dr. Merlin K 3133
Dykens, Dr. James W 3589

Eagleton, Hon. Thomas, F., U.S. Senator from Missouri 3119
Edwards, Nelson 1497
Egan, William A., Governor of the State of Alaska 2168, 2198
Ehrlich, Dr. S. Paul, Jr 4231–4234
Eiserdorfer, Dr. Carl 1854
Ekeberg, John M 335
Ellender, Hon. Allen J., U.S. Senator from Louisiana 1144, 2101, 3562
Endicott, Dr. Kenneth M 4318–4346, 4352–4355
Evans, Daniel J., Governor of the State of Washington 1115, 1148

Fasser, Paul J., Jr 353, 382, 1118
Filerman, Dr. Gary 2410
Fletcher, Arthur A 268
Fortner, Rev. William R 2573
Francis, Yvette 1739
Frazier, Dr. Robert G 1711
Frommeyer, Dr. Walter B 1900
Fudenberg, Dr. H. H 2697
Futterman, Jack S 1277, 1289

Garrett, James F 1169
Gemignani, Robert J 1150
Giannini, Dr. Margaret J 1622
Gibson, Dr. Robert 1751
Gilligan, John J 2093
Gilligan, John J., Governor of the State of Ohio 2093
Goldfeld, Robert 1954
Gordon, Jerome B 1503
Gorman, Mike 1579
Gravel, Hon. Mike, U.S. Senator from Alaska 2196
Griffin, Dr. Herschel E 1957
Guenther, George C 305
Guinee, Dr. Vincent F 1924
Guthrie, Mrs. Marjorie 1886

Habermeyer, Howard W 706
Harding, Charles B 1729
Hardy, Dr. Janet B 2350
Harmon, John C., Jr 2720
Hartke, Hon. Vance, U.S. Senator from Indiana 1127, 2452
Heartwell, William L., Jr 1881
Hecht, George J 1862
Hellegers, Dr. André 1669
Helsel, Elsie D., Ph. D 2591
Henderson, Dr. James 2330
Heyworth, James O 2659
Hildebrand, George H 407
Hodgson, Hon. James D 1
Hopkins, Stephen A 2091
Hughes, Hon. Harold E., U.S. Senator from Iowa 3569
Humphrey, Hon. Hubert H., U.S. Senator from Minnesota 2205, 2214, 2769, 2779, 3080

	Page
Ingraham, Dr. Hollis S	1980
Irving, Dr. Lawrence	2190
Ives, George S	681
Jaffee, Frederick	1664
James, Dr. George	2601
Javits, Hon. Jacob K., U.S. Senator from New York	3061
Jentsen, Allen	2075
Johnson, Dr. Kenneth O	2708
Jones, Conrad M	30, 31, 63–66, 105
Jordan, Dr. Robert	1627, 1635
Kailin, Dr. Eloise	1860
Kennedy, Hon. Edward M., U.S. Senator from Massachusetts	2104
Kenney, Dr. John	2436
Kerby, Austin E	1486
Kief, Charles E	681
Kimmey, Dr. James R	1748
King, Ruben K	2078
Kingman, George M	4092, 4094
Kirkpatrick, Loy	2439
Kottke, Dr. Frederic J	2749
Kreshover, Dr. Seymour J	3784, 3788
Krueger, Herbert A	2097
Kupfer, Dr. Carl	4057–4065
La Veck, Dr. Gerald D	3125, 4025–4033
Leavitt, Dr. Milo C	4146, 4150
Lee, Randolph W	1103, 1121, 1139
Lehmann, Dr. Justus F	2776
Leonard, Dr. Arnold S	1636
Levin, Norman	2901
Longmire, Richard M	1164
Lourie, Norman V	2029
Lovell, Malcolm R., Jr	33, 38, 48, 49, 54, 56, 58, 188
Lowman, Dr. Edward W	2682
Luota, Dr	2336
McGonagle, John J	2841
McLean, Patricia	2854
McLeod, Elwood	2088
MacNichol, Dr. Edward F., Jr	3633, 3921–3943
Maddox, George L	3126
Magnuson, Hon. Warren G., U.S. Senator from Washington	3580
Mandel, Marvin, Governor of the State of Maryland	1124
Marston, Dr. Robert Q	3617
Mathias, Hon. Charles McC., U.S. Senator from Maryland	2458
Matson, Wayne R	2657
Mattson, Robert H	1129
Maumenee, Dr. A. Edward	2630
Melby, Dr. Edward C., Jr	2391
Merritt, Dr. Houston	2281, 2310
Miller, Charles H	1101, 1105, 1110, 1113, 1117, 1120, 1139, 1141, 1156, 1170, 1290, 3627, 3630, 3641, 3645, 3647, 3746, 3752, 3939, 3990, 4031, 4059, 4125, 4340
Miller, Edward B	642
Miller, Gregory A., Ph. D	2608
Mondale, Hon. Walter F., U.S. Senator from Minnesota	2747, 3071
Moody, O. William	2427
Moore, Geoffrey H	33, 43, 47, 48, 53, 98
Moran, Robert D	766
Moreland, Alvin F., D.V.M	2344
Morris, Jonas	1539
Moser, Dr. Hugo W	1626, 1633
Moss, Hon. Frank, U.S. Senator from Utah	3564, 3571
Murphy, Marion, R.N., Ph. D	2529
Murray, Dr. Roderick	3658, 3661
Murtaugh, Joseph S	2511

Page
Nadel, Dr. Jay A. 2674
Nash, Peter G 513
Neal, Olly 2913
Newman, Edward 1120, 1123, 1130
Newman, Howard 1091, 1173, 1180
Nunn, Louie B., Governor of the State of Kentucky 2085

Ogden, C. Robert 2917, 2949
O'Meara, Gen. Andrew P 2388
Orr, Dr. Jack E 2780

Pastore, Hon. John O., U.S. Senator from Rhode Island 1166
Percy, Hon. Charles H., U.S. Senator from Illinois 2279
Perry, Thomas J 2408
Peterson, Kenneth 1989
Peterson, Russell W 2082
Piggott, Bess M 2546
Pollard, Dr. H. Marvin 1889
Popick, Bernard 1282
Pottinger, Stanley J 1368
Prouty, Hon. Winston, U.S. Senator from Vermont 3129
Putnam, Dr. Frank K 1814

Rachlin, Sylvia N 2404
Rall, Dr. David P 4028, 4089–4096
Rall, Dr. Edward 3834–3849
Ranney, Jack L 2710
Reagan, Ronald, Governor of the State of California 2080
Reed, Dr. George 2289, 2301
Reed, Dr. Joseph B 2943
Reidier, Jack 1496
Rockefeller, Nelson A., Governor of the State of New York 2092
Rockstein, Morris, Ph. D 2624
Rodriguez, Antonio F 781
Russell, Harold 519
Ryan, Hon. William F., U.S. Representative from New York 2159

Sackler, Arthur M 2592
Salley, Dr. John 3047
Salmon, Peter J 2868
Saslow, Dr. George 2717
Schaefer, Marguerite J 2553
Schiefelbusch, Dr. Richard L 2376
Schnibbe, Harry C 1600
Schreiner, Dr. George E 2318
Schwabacher, Morton L 2643
Schwarting, Dr. Arthur E 2793
Schwarz, Dr. M. Roy 2191
Schweizer, George J., Jr 2572
Scott, Jessie 4348–4352
Scott, Mrs. Joe McCalmont 2647
Seegmiller, Dr. J. Edwin 3026
Shannon, Dr. Karr 3563
Sherman, Dr. John F 4213, 4340
Siegel, Dr. Benjamin 2270
Sonnenreich, Michael R 1453
Spencer, Dr. William A 2215
Spong, Hon. William B., Jr., U.S. Senator from Virginia 2096
Stetin, Sol 2266
Stetson, Dr. Chandler A 1804
Stetten, Dr. DeWitt, Jr 3630, 3880–3891
Stevens, Hon. Ted, U.S. Senator from Alaska 2167
Stillman, Dr. J. Sydney 2976
Stubblefield, Dr. Robert L 1768
Stunkard, Dr. Albert 1782, 1798

	Page
Taber, Martha	2846
Taft, Hon. Robert, Jr., U.S. Senator from Ohio	1743
Terry, Dr. Luther L	2676
Thomas, Dr. Andrew	2438
Thomas, Dr. Lewis	1846
Thorpe, Dr	2333
Tierney, Thomas M	1309
Tunney, Hon. John V., U.S. Senator from California	2142
Twiname, John D	1086–1183
Tyssowski, Mrs. Mildred L	1290, 1315
Usery, W. J., Jr	453
Vowell, Raymond W	2095
Washburn, Dr. Donald A	3019
Watson, Albert II	752
Weisbrod, Harry	1507
Wennberg, John E	3149
Wertz, Terrell M	1485
White, Francis	1517
Whiting, Dr. Frank J	1789
Whitten, E. B	2733
Wiemer, Mrs. Ruth	2713
Williams, Dr. Harold H	1808
Williams, Hon. Harrison A., Jr., U.S. Senator from New Jersey	2130
Williamson, Kenneth	1972
Wilson, Dr. Vernon E	3541
Wisland, Milton V., M.D	2453
Wolfe, Mrs. Corrinne H	1110
Yntema, Theodore O	573
Zarb, Frank G	560
Zeisel, John	1617
Zigler, Dr. Edward	1346

SUBJECT INDEX

CABINET COMMITTEE ON OPPORTUNITIES FOR SPANISH-SPEAKING PEOPLE

Page
Automobile driving licenses, procurement of by Spanish-speaking people 784
Budget:
  Authority for 782
  Justification of 774
  Staff of 774
  Testimony of Director 781
Cuban refugee program 790
Employment program 785
English language:
  Barrier of inability in 793
  Encouragement to learn 787
Income, average family 789
Migrant farmworkers 783
Small business loans 785
Spanish and Latin population in United Stated 788

COMMISSION ON RAILROAD RETIREMENT

Authority for 591, 608, 609, 613
Budget, justification 575, 609
Chairman, testimony of 608
Members 594
Program for 595
Railroad retirement system, complexity of 608

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Aged:
  Nursing homes 1173
  Nutrition problems 977, 1143, 1027, 1172
  Training of workers 1048, 1076, 1143
Aging, special programs:
  Budget amendment 1069
  Foster grandparents 971, 984, 990, 1136, 1140, 1148
  Justification of budget request 970, 3184
  Program purpose and accomplishments 987, 3189
  State tables 1136
  Testimony concerning 1136
  Training, cuts in funding 1169, 3196
  White House Conference on Aging 971, 978, 989, 1136, 1137
Aid to families with dependent children 846
  855, 862, 870, 878, 880 905, 911, 938, 1021, 1089, 1104
Alcoholism:
  Funding to combat 3142, 3156, 3226, 3249, 3257, 3565–3572
  Nature and extent of problem 3226, 3232–3233, 3249
Allergic diseases (*See also* National Institute of Allergy and Infectious Diseases) 3975
Animal research resources 4111–4114, 4128–4131
Arteriosclerosis (*See also* National Heart and Lung Institute) 3726
Arthritis and metabolic diseases. (*See* National Institute of Arthritis and Metabolic Diseases.)
Ash Council recommendations 1107

Page

- Biologics standards:
  - Justification of budget estimates 3649
  - Program purpose and accomplishments 3657
  - Testimony concerning 3658
- Black plague 3419
- Cancer (*see also* National Institute of Cancer, infra):
  - Breast 3685, 3690, 3692–3693, 3702
  - Conquest of 3137, 3628, 3634, 3707–3709
  - Leukemia 3675, 3702
  - Nature and extent of problem 3673, 3681, 3683–3694
  - Research centers 3705
  - Research performed by other than NIH 3709
  - Smoking and lung 3688, 3690, 3692–3693
- Cardiac diseases (*see also* National Heart and Lung Institute) 3727
- Child day care 901, 903, 907, 912, 916
- Child development. (*See* Office of Child Development, infra.)
- Child health and human development. (*See* National Institute of Child Health and Human Development, infra.)
- Child welfare:
  - Research 1026
  - Services:
    - Justification of budget request 877
    - Program purpose and accomplishments 885
    - Testimony on 1109
  - Training 1110
- Children and youth. (*See* White House Conference on Children and Youth, infra.)
- Cholera 3418
- Civil rights. (*See* Office for Civil Rights, infra.)
- Clinical Research Centers:
  - Fort Worth, Tex 3252, 3265
  - Lexington, Ky 3252, 3265
- Coal Workers:
  - Pneumoconiosis 3438
  - Special Benefits:
    - Administration of program 1209
    - Benefit claims received 1207, 1212
    - Black lung disease, diagnosis by X-ray 1284
    - Justification of budget request 1199
    - Program purpose and accomplishments 1212
    - Testimony concerning 1266, 1268, 1279
- Community Action Groups, relation to HEW 1089
- Community mental health centers 1130, 3244
- Comprehensive health planning and services:
  - Justification of budget estimates 3158, 3306
  - New positions requested 3173, 3338
  - Program purposes and accomplishments 3169, 3330
  - State tables 3171, 3336
  - Testimony concerning 3550, 3592
  - Training in 3319
- Construction Amendments, 1970, Developmental Disabilities Services and Facilities:
  - Implementation of 952, 959, 968, 1126
- Crippled children's services 3353, 3548
- Delinquency prevention. (*See* Youth Development and Delinquency Administration, infra.)
- Dental research. (*See* National Institute of Dental Research, infra.)
- Departmental Management:
  - General provisions 1441
  - Justification of budget estimate 1388, 3201
  - Testimony concerning 1446
- Diabetes 3846, 4064
- Digestive diseases 3836

Page

Disease control:
  Justification of budget estimates____ 3175, 3401
  New positions requested____ 3182, 3454
  Program purposes and accomplishments____ 3180, 3447
  State tables____ 3453
  Testimony concerning____ 3545
Drug abuse: (*See also* National Commission on Marihuana and Drug Abuse, infra):
  Funding to combat____ 3142, 3146, 3225, 3247, 3573–3576
  National Clearinghouse for Information____ 3256
  Nature and extent of problem____ 3225, 3230, 3234, 3247
  Rehabilitation of victims____ 940, 947, 1109, 1170, 3252, 3265
Encephalitis ____ 3413
Environmental health sciences. (*See* National Institute of Environmental Health Sciences, infra.)
Epidemic control____ 3422
Epilepsy ____ 3904, 3912
Eye program. (*See* National Eye Institute.)
Family Health Centers____ 3165, 3550
Family planning:
  Maternal and child health budget____ 1101, 1107
  Programs for____ 1105, 3141, 3371, 3549, 3639, 4013, 4025, 4031
  Social and rehabilitation budget____ 1101
Fort Detrick, Md____ 3713
Gastroenteritis ____ 3416
Genetics research____ 3621, 3882
Glaucoma (*See also* National Eye Institute)____ 4043, 4057–4059
Grants, General Research Support:
  Justification of budget estimates____ 4186
  Program purpose and accomplishments____ 4192
Head Start:
  Justification of budget estimates____ 1332
  Program costs____ 1353
  Program purpose and accomplishments____ 1341
  Teacher salary increase____ 1349
Health and scientific affairs____ 3133
Health centers. (*See* Family Health Centers, supra; Community Mental Health Centers, supra.)
Health education:
  Area centers____ 3139
  Loans—Justification of budget estimates____ 4310
Health Manpower:
  Justification of budget estimates____ 4235
  New positions____ 4308
  Program purpose and accomplishments____ 4299
  Shortage ____ 3299
  Testimony concerning____ 4318
Health maintenance organizations:
  Medicaid ____ 1096, 1181
  Regional medical programs____ 3148
  Stress on prevention____ 3140, 3293
Health programs:
  Coordination of____ 3557
  Funding, balance in____ 3143
  Health and Scientific Affairs, Assistant Secretary, statement of____ 3135
  Health care delivery____ 3135, 3139, 3292
  Rationale for 1972 budget requests____ 3135
Health sciences:
  Advanced study in. (*See* John E. Fogarty International Center for Advanced Study in the Health Sciences, infra.)
  Environmental. (*See* National Institute of Environmental Health Sciences, infra.)
Health Service Corps. (*See* National Health Service Corps, infra.)

Health Services and Mental Health Administration:
  Administrator: Page
    Justification of budget estimates 3533
    Program purpose and accomplishments 3539
  Buildings and facilities:
    Justification of budget estimates 3527
    Program purpose and accomplishments 3531
  Justifications of budget estimates 3152–3540
  Testimony concerning 3541
Health Services Research and Development:
  Justification of budget estimates 3283
  Manpower substitution 3299
  New positions requested 3305
  Program purposes and accomplishments 3303
  Testimony concerning 3553
  Training in 3301
Health Statistics, National:
  Justification of budget estimates 3502
  New positions 3518
  Program purpose and accomplishments 3513
  Testimony concerning 3554
Heart disease. (*See also* National Heart and Lung Institute, infra:)
  Rehabilitation of victims 942, 1017
Hepatitis 3417, 3658, 3660, 3955, 3986
HEW Reorganization, President's proposal 1107
Hodgkin's disease 3685, 3690, 3701
Immunization programs—Increase in funding 3142, 3163, 3545
Income maintenance 1029, 1044, 1164
Infant mortality 4005
Infectious diseases. (*See* National Institute of Allergy and Infectious Diseases, infra.)
Information science. (*See* National Commission on Libraries and Information Sciences, infra.)
Injury control 3445
John E. Fogarty International Center for Advanced Study in the Health Sciences:
  Justification of budget estimates 4133
  Program purpose and accomplishments 4143
  Testimony concerning 4146
Kidney dialysis 3842
Kidney disease control 3396
Leaded paint poisoning:
  Attack on 3142, 3179, 3181, 3585
  Extent of 3142, 3180
Leukemia 3675, 3702
Libraries. (*See* National Commission on Libraries and Information Science, infra.)
Lung research. (*See also* National Heart and Lung Institute, infra) 3750
Marihuana. (*See* National Commission on Marihuana and Drug Abuse, infra.)
Maternal and Child Health:
  Justification of budget estimates 3339
  New positions 3379
  Program purpose and accomplishments 3363
  State tables 3367
  Testimony concerning 3548
Medicaid:
  Denials of retroactive payments 1180
  Justification of budget request 861
  Program purpose and accomplishments 882
  Spending 1091
  Testimony concerning 1091
Medical care costs 3295

Page

- Medical facilities construction:
  - Budget estimates, justifications 3455
  - New positions 3480
  - Program purpose and accomplishments 3467
  - State tables 3470
  - Testimony concerning 3555, 3672
- Medical sciences, general. (*See* National Institute of General Medical Sciences, infra.)
- Medicare:
  - Budget and nature of program 1263, 1275, 1300, 1309
  - Spending 3136
  - Standards 3327
- Mental Health:
  - Budget estimates, justification 3152, 3208
  - Manpower development 3236, 3261
  - Mission 3223
  - New positions requested 3157, 3266
  - Program purpose and accomplishments 3156, 3259
  - Testing concerning 3544, 3563, 3564
- Mental illness:
  - Nature and extent of problem 3231
  - Rehabilitation of victims 940, 954, 961, 1017, 1052, 1126
- Migrant health care 3325, 3551
- Model Cities program 946, 3597
- National Center for Health Services Research and Development. (*See* Health Services Research and Development, supra.)
- National Center for Health Statistics. (*See* Health Statistics, National, supra.)
- National Eye Institute:
  - Justification of budget estimates 4035
  - New positions 4056
  - Program purpose and accomplishments 4052
  - Testimony concerning 4052
- National Heart and Lung Institute:
  - Fellowships and training grants 3732
  - Justification of budget estimates 3715
  - New postions 3744, 3751
  - Program purpose and accomplishments 3739
  - Research grants 3731
- National Health Service Corps:
  - Funding of 3167
  - Need for 3167
- National Institute of Allergy and Infectious Diseases:
  - Justification of budget estimates 3945
  - Program purpose and accomplishments 3970
  - Testimony concerned 3975
- National Institute of Arthritis and Metabolic Diseases:
  - Justification of budget estimates 3789
  - Program purpose and accomplishments 3828
  - Testimony concerning 3834
- National Institute of Cancer:
  - Fellowships 3678
  - Justification of budget estimate 3663
  - New positions 3700, 3704
  - Program purpose and accomplishments 3696
  - Research grants 3676
  - Testimony concerning 3701
- National Institute of Child Health and Human Development:
  - Justification of budget estimates 3995
  - New positions 4024
  - Program purpose and accomplishments 4019
  - Testimony concerning 4025

Page

- National Institute of Dental Research:
  - Dentists, shortage of 3787
  - Fellowships and training grants 3771
  - Justification of budget estimate 3755
  - New positions 3783
  - Oral cancer 3768, 3775
  - Periodontal disease 3765, 3774, 3784
  - Program purpose and accomplishments 3779
  - Research grants 3770
  - Testimony concerning 3784
  - Tooth decay 3784
- National Institute of Environmental Health Sciences:
  - Justification of budget estimates 4067
  - New positions 4088
  - Program purpose and accomplishments 4085
  - Testimony concerning 4089
- National Institute of General Medical Sciences:
  - Justification of budget estimates 3851
  - New positions 3879
  - Program purpose and accomplishments 3876
  - Testimony concerning 3880
- National Institute of Mental Health. (*See* Mental Health, supra.)
- National Institute of Neurological Diseases and Stroke:
  - Justification of budget estimates 3893
  - Program purpose and accomplishments 3917
  - Testimony concerning 3921
- National Institutes of Health:
  - Budget increases 3138
  - Budget reductions 3150
  - Buildings and facilities, justification of budget estimates 4195
  - Grants, approved but unfunded 3643
  - Management fund:
    - Justification of budget 4200
    - New positions 4212
    - Program purpose and accomplishments 4209
  - Office of the Director:
    - Justification of budget estimates 4179
    - New positions 4185
    - Program purpose and accomplishments 4185
    - Testimony concerning 4213
  - Perinatal study 3632, 3926–3936
  - Testimony of Director 3617, 3626
- National Library of Medicine:
  - Justification of budget estimate 4151
  - New positions 4174
  - Program purpose and accomplishments 4168
  - Testimony concerning 4175
- Neurological diseases and stroke. (*See* National Institute of Neurological Diseases and Stroke, infra.)
- Nutrition 3430, 3546, 4015, 4032
- Occupational health 3180, 3434, 3439, 3547
- Office for Civil Rights:
  - Justification of budget estimates 1360
  - New positions requested 1367, 1369
  - Program purpose and accomplishment 1367
  - Testimony on 1371
- Office of Child Development:
  - Foster care program 1352
  - Home Start program 1350
  - Justification of budget estimates 1317
  - New positions requested 1345, 1359
  - Program purposes and accomplishments 1340
  - State tables 1343
  - Statement of Director 1347
- Overseas activities. (*See* Special Foreign Currency Program, infra.)
- Parkinsonism 3905

Patient care and special health services: Page
  Justification of budget estimates 3481
  Program purpose and accomplishments 3498
  Testimony concerning 3556
Pay costs for fiscal year 1971, civilian and military 3205
Poisoning. (*See* Leaded paint poisoning, supra.)
Pollution:
  Air 4093
  Noise 4094
  Pesticide related 4096
Public assistance, grants to States:
  Child welfare 877, 885
  Control of costs 1087
  Justification of budget requests 827
  Maintenance payments 845, 880, 1089
  Medicaid payments 861, 882
  Program purpose and accomplishment statements 880
  Rehabilitation of handicapped 945
  Social services 870, 883
  State estimates 1088
  State tables 837, 886
Public Health Service Hospitals:
  Closings? 3146, 3490
  Future role of 3141, 3556
Rabies 3420
Radiological health 3440, 3547
Regional medical programs:
  Cancer research in 3710
  Funding reduction 3144, 3149
  Justification of budget estimates 3380
  Program purpose and accomplishments 3397
  Program for 1971 and 1972 3390
  Reevaluation of 3140, 3145
  Relation to HMO's 3148
  Testimony concerning 3551, 3595, 3600
Rehabilitation:
  Drug abuse victims 940, 947, 1109, 1170, 3252, 3265
  Rehabilitation Institute of Chicago 1171
  Services and facilities:
  Basic State grants 956, 962, 1124
  Justification of budget request 922
  Program purpose and accomplishments 956
  State tables 962
  Testimony on 1121
Repatriated U.S. Nationals 835, 860, 881
Research resources:
  Justification of budget estimates 4097
  Program purpose and accomplishments 4118
  Testimony concerning 4124
Respiratory diseases 3415, 3728, 3751, 3981
Retirement pay, medical benefits, commissioned officers:
  Justification of budget estimates 3519
  Program purpose and accomplishments 3525
Rodent control, funding 3164, 3322, 3551, 3597
Rubella inoculations 3322, 3424, 3578
Saint Elizabeths Hospital:
  Justification of budget estimates 3267
  New positions requested 3275, 3281
  Patient population 3272, 3275
Salmonellosis 3421
Scientific activities overseas. (*See* Special Foreign Currency Program, infra.)
Sickle Cell anemia 3729, 3752
Smallpox 3416
Smoking and health 3394, 3552
Social and rehabilitation activities overseas. (*See* Special Foreign Currency Program, infra.)

Page

- Social and Rehabilitation Service:
  - Administration, statement of, 1086
  - Budget requests justification, 827
  - Budget requests, summary, 1086, 1087
  - Personnel supported, 1114, 1182
  - Research and training:
    - Budget amendment, 1076
    - Jusitfication of budget request, 1008, 3191
    - Program purpose and accomplishments, 1043
    - Testimony concerning, 1163
    - Training, 1035
  - Salaries and expenses:
    - Budget amendment, 1082
    - Justification of budget request, 1057, 3197
    - New positions requested, 1060, 1063, 1065–1068, 1169, 1180
    - Testimony concerning, 1180
  - Social services:
    - Budget request, 1100
    - Limitation on payments, section 208, 836, 1111, 1115
    - Personnel in, 1102
    - Reform legislation, 1088
- Social Security activities overseas. (*See* Special Foreign Currency Program, infra.)
- Social Security Administration:
  - Benefits paid overseas, 1302
  - Commissioner, statement of, 1260
  - Construction, limitation on:
    - Justification of budget request, 1251
    - Program purpose and accomplishments, 1259
  - Testimony concerning, 1270, 1313
  - Effect of H.R. 1, 1261
  - Increased benefits, 1273
  - Justification of budget requests, 1185
  - Salaries and expenses, limitation on:
    - Expenses, breakdown of, 1238, 1240, 1300
    - Justification of budget request, 1218, 1232
    - Program purpose and accomplishments, 1250
    - Testimony concerning, 1269, 1300
  - Summary of budget requests, 1260, 1271
  - Trust funds, payments to:
    - Hospital insurance for the uninsured, 1192, 1292
    - Justification of budget requests, 1185
    - Military service credits, 1194, 1292
    - Program purpose and accomplishments, 1197
    - Retirement benefits for certain uninsured persons, 1196, 1293
    - Supplementary medical insurance, 1190, 1291
    - Testimony concerning, 1267
  - Trust fund balance, 1315
- Special Foreign Curency Program:
  - Scientific Activities Overseas:
    - Justification of budget estimates, 4215
    - Obligations by country, 4221
    - Program purpose and accomplishments, 4230
    - Testimony concerning, 4231
  - Social and Rehabilitation Activities Overseas:
    - Justification of budget request, 1049
    - Program purpose and accomplishments, 1055
    - Projects overseas, table, 1056
    - Testimony concerning, 1169, 1180
  - Social Security activities overseas:
    - Justification of budget request, 1213
    - Program purpose and accomplishments, 1217
    - Testimony concerning, 1298
- Streptococcal infections, 3416
- Stroke. (*See also* National Institute of Neurological Disieases and Stroke, supra), 3906

Page

- Training, cuts in funding:
  - Aging 1169, 3196
  - Rehabilitation 1165
  - Social work 1035, 1047, 1109, 1168
- Training grants, unfunded 3991
- Trauma 3862
- Tuberculosis. (*See also* National Heart and Lung Institute, supra) 3425
- Unemployment, in relation to welfare payments 1090
- Veneral diseases:
  - Funding for control of 3142, 3163, 3322,3426, 3546
  - Gonorrhea 3427
  - Syphilis 3428
- Vitamin C 3987
- Welfare:
  - Costs of 1087
  - Emergency assistance 858
  - Reform legislation 1087, 1261
  - State estimates 1088
- White House Conference on Children and Youth:
  - Justification of budget estimates 1331
  - Program purpose and accomplishments 1340
  - Testimony on 1356
- Work incentives:
  - Justification of budget estimates 900
  - Program purpose and accomplishments 915
  - State tables and field staff 917
  - Testimony on 1117
  - Training program 909, 915
- Youth Development and Delinquency Prevention
  - Justification of budget request 994
  - Juvenile delinquency problem 999
  - Program purpose and accomplishments 1004
  - Testimony concerning 1149

DEPARTMENT OF LABOR

- Budget, summary of 26–28, 65
- Computer center for Department of Labor 108
- Construction:
  - Cabinet Committee on 109
  - Wages, suspension of Davis-Bacon Act 289
- Construction industry, costs of 111
- Construction Industry Bargaining Commission 62, 473
- Consumer credit protection, budget request for 65
- Consumer Price Index, revision of 95, 106
- Disaster Relief Act, payments resulting from 33
- Discrimination—(See Sex discrimination, infra)
- Equal Employment Opportunity in Federal Government 21
- Federal Unemployment benefits and allowances:
  - Justification of budget estimates 343
  - Summary of budget request 353, 358
- Federal Workmen's Compensation Benefits 321
- Garnishment—(See Wage garnishment, infra.)
- Grants to States for unemployment insurance and employment services, limitation on 366
- Handicapped, President's Committee on Employment of the 519
- International Labor Affairs, Bureau of:
  - Justification of budget estimate 387
  - Special foreign currency program 401
- International Labor Organization 24, 410
- Job Banks 32
- Job Corps:
  - Budget request 198
  - Cost per trainee 203
  - Overhaul of 12, 37
- Job opportunities in the business sector program 10
- Jobs—(See Summer jobs, infra.)

Page

- Labor-management relations:
  - Construction industry, 17, 62, 112
  - Steel industry, 18
  - Transportation industry, 17
- Labor-Management Services Administration, 423
- Labor Statistics, Bureau of:
  - Justification of budget estimate, 67
  - Summary of budget, 115
- Manpower Administration:
  - Employees paid for, 212
  - Programs explained, 220
  - Salaries and expenses:
    - Justification of budget, 117
    - Summary of budget, 216
- Manpower training services:
  - Justification of budget, 147
  - Summary of budget, 198
  - 2% set-aside for, 208
- Neighborhood Youth Corps, restructuring of, 11, 36
- Occupational Safety and Health Act, funding of, 19
- Occupational Safety and Health Administration, 63
- Occupational Safety and Health Workplace Standards Administration, 305
- "Philadelphia Plan" and minority group labor force, 64
- Positions requested, new, 27
- President's Committee on Employment of the Handicapped—(See Handicapped, supra.)
- Public Employee's strikes, 475
- Public information activities, 105
- Purchase survey, 107
- Secretary, Office of the, 532
  - Opening statement, 1
- Sex discrimination in employment, 22
- Solicitor office of, 481, 517
- Strikes—(See Public Employee's strikes, supra.)
- Summer jobs for youth, 34
- Trade adjustment assistance program, 219
- Training, authorization under OEO act expiring, 30
- Unemployment:
  - Among aerospace workers, 15, 43
  - Extent and causes of, 13, 42, 47, 115
  - Now transitional, 14, 42
  - Service-oriented hardest hit, 13
  - Skill conversions help lesson, 44
- Unemployment insurance:
  - Abuse of, 48
  - Extension of benefits, 58
  - 1970 amendments, 16, 55
  - Qualifications for, 51
  - Rising claims, 16
- Veterans, job placement for, 10, 35, 63, 129, 134, 463
- Wage garnishment laws, 65, 281
- Wage stabilization commission, 62
- Working force growing rapidly, 13
- Workplace standards administration, 233, 268
- Youth, summer jobs—(See Summer jobs, supra.)

FEDERAL MEDIATION AND CONCILIATION SERVICE

- Budget, justification, 715, 743–745
- Longshoremen's union, 739
- Preventive mediation, 720, 724, 741
- Program structure, 716
- Wage losses in fiscal year 1970, 734
- Workload projections, 723, 741

NATIONAL COMMISSION ON LIBRARIES AND INFORMATION SCIENCES

Page
Justification of budget estimates 1472
Testimony concerning 1471

NATIONAL COMMISSION ON MARIHUANA AND DRUG ABUSE

Justification of budget estimates 1461
New positions requested 1459
Testimony concerning 1456, 3148

NATIONAL LABOR RELATIONS BOARD

Budget, justification 615
Cases heard, types of 637
Chairman, testimony 642
Labor practices, unfair procedures 639, 657
Positions 631
Workload, increase 643

NATIONAL MEDIATION BOARD

Airline cases 665
Budget, justification 659
History 663
Program and performance 660, 663
Salaries and expenses 672
Testimony concerning 681

NATIONAL RAILROAD ADJUSTMENT BOARD

Air Line Cases 665
Budget, justification 674
History of 663
Program and performance 660
Railway Labor Act 681
Testimony concerning 681, 684
Voluntary arbitration and emergency disputes 668

OCCCUPATIONAL SAFETY AND HEALTH REVIEW COMMISSION

Budget, justification 762
Duties, nature of 766, 771
Job safety acts 770
Legal assistants, use of 771
Testimony concerning 766

OFFICE OF ECONOMIC OPPORTUNITY

Authorization, lack of 826
Director, statement of 795

RAILROAD RETIREMENT BOARD

Budget, justification 690
Military service credits, payment for 693
Organizational structure 690
Retirement, legislation affecting 706
Salaries and expenses, limitation on 695
Testimony concerning 706

U.S. SOLDIERS' HOME

Admission to 758
Beds, domiciliary and hospital 757, 760
Budget, justification 749, 753, 759
Nonjudicial punishment, funds from 755
Testimony concerning 752

THIS BOOK DOES NOT CIRCULATE

NIH LIBRARY
Amazing Research.
Amazing Help.
http://nihlibrary.nih.gov

10 Center Drive
Bethesda, MD 20892-1150
301-496-1080

NIH LIBRARY
4 0057 3940

NIH LIBRARY
3 1496 00187 7912

DEC - 4 2002